# Table of Contents

Texas A&M University Undergraduate Catalog ........................................... 11
University Academic Calendar ...................................................................... 13
Board of Regents and Administrative Officers ............................................. 17

General Information ....................................................................................... 18
  History and Development ........................................................................... 18
University Core Curriculum .......................................................................... 19
Student Learning Outcomes .......................................................................... 24
Degree Information ......................................................................................... 24
  International and Cultural Diversity Requirements .................................. 34
Admission ........................................................................................................ 39
Registration and Academic Status ................................................................. 66
Grading System ............................................................................................... 68
Housing ........................................................................................................... 70
Orientation ...................................................................................................... 71
Services for Students ...................................................................................... 72
Campus Life .................................................................................................... 75

Tuition, Fees and Other Financial Information ............................................... 80
Financial Assistance and Scholarships ......................................................... 87
University Policies ......................................................................................... 90
International Opportunities for Students ..................................................... 91
Honors and Undergraduate Research ........................................................... 92
Transition Academic Programs .................................................................. 95
University Studies Degrees ......................................................................... 96
Interdisciplinary Programs ........................................................................... 97
  Neuroscience ............................................................................................... 97
  Neuroscience - Minor ................................................................................ 97
  Neuroscience - Certificate .......................................................................... 98

College of Agriculture and Life Sciences ..................................................... 100
Interdepartmental Degree Programs ........................................................... 105
Department of Agricultural Economics ....................................................... 105
  Agribusiness - BS ..................................................................................... 107
  Agricultural Economics - BS, Finance and Real Estate Option ............... 109
  Agricultural Economics - BS, Food Marketing Systems Option .......... 110
  Agricultural Economics - BS, Policy and Economic Analysis Option ... 112
  Agricultural Economics - BS, Rural Entrepreneurship Option ............ 113
  Agricultural Economics - 5-Year Bachelor of Science/Master of Public Service Administration ................................................................. 115

Agricultural Economics - Minor ................................................................. 117
Financial Planning - Minor ........................................................................... 117
International Trade and Agriculture - Certificate ....................................... 118

Department of Agricultural Leadership, Education, and Communications ........................................... 118
  Agricultural Communications and Journalism - BS ............................. 119
  Agricultural Leadership and Development - BS .................................. 120
  Agricultural Science - BS ....................................................................... 121
  University Studies - BS, Leadership Studies Concentration ............... 122
  Agricultural Communications and Journalism - Minor ....................... 122
  International Agricultural Development - Minor .................................... 123
  Leadership - Minor .................................................................................. 123

Department of Animal Science ................................................................... 123
  Animal Science - BS, Production/Industry Option .................................. 125
  Animal Science - BS, Science Option ...................................................... 127
  Animal Science - Minor .......................................................................... 128
  Equine Science - Certificate .................................................................... 128
  Meat Science - Certificate ...................................................................... 128

Department of Biochemistry/Biophysics ....................................................... 129
  Biochemistry - BS .................................................................................. 130
  Genetics - BS ......................................................................................... 131
  Biochemistry - Minor .............................................................................. 132
  Genetics - Minor ..................................................................................... 133

Department of Biological and Agricultural Engineering .......................... 133
  Agricultural Systems Management - BS ............................................... 134
  Biological and Agricultural Engineering - BS ....................................... 135
  Agricultural Systems Management - Minor ......................................... 137

Department of Ecosystem Science and Management ................................ 137
  Ecological Restoration - BS ..................................................................... 138
  Forestry - BS .......................................................................................... 139
  Rangeland Ecology and Management - BS, Ranch Management Option ........................................................................................................... 140
  Rangeland Ecology and Management - BS, Rangeland Resources Option ........................................................................................................ 141
  Renewable Natural Resources - BS ......................................................... 142
  Spatial Sciences - BS .............................................................................. 144
  Forestry - Minor ...................................................................................... 144
  Rangeland Ecology and Management - Minor ....................................... 145
  Spatial Sciences - Minor ......................................................................... 145
  Watershed - Certificate ............................................................................ 145
<table>
<thead>
<tr>
<th>Department of Accounting ..................................................</th>
<th>213</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting - BBA ..........................................................</td>
<td>215</td>
</tr>
<tr>
<td>Energy Accounting - Certificate .......................................</td>
<td>217</td>
</tr>
<tr>
<td>Department of Finance ...................................................</td>
<td>217</td>
</tr>
<tr>
<td>Finance - BBA ..............................................................</td>
<td>218</td>
</tr>
<tr>
<td>Commercial Banking - Certificate .......................................</td>
<td>220</td>
</tr>
<tr>
<td>Investment Banking - Certificate .......................................</td>
<td>220</td>
</tr>
<tr>
<td>Trading, Risk and Investments - Certificate .........................</td>
<td>220</td>
</tr>
<tr>
<td>Department of Information and Operations Management .............</td>
<td>221</td>
</tr>
<tr>
<td>Management Information Systems - BBA ..................................</td>
<td>222</td>
</tr>
<tr>
<td>Supply Chain Management - BBA ..........................................</td>
<td>224</td>
</tr>
<tr>
<td>Department of Management ................................................</td>
<td>226</td>
</tr>
<tr>
<td>Management - BBA ..........................................................</td>
<td>227</td>
</tr>
<tr>
<td>Entrepreneurial Leadership - Certificate ................................</td>
<td>229</td>
</tr>
<tr>
<td>Department of Marketing ..................................................</td>
<td>229</td>
</tr>
<tr>
<td>Marketing - BBA .............................................................</td>
<td>231</td>
</tr>
<tr>
<td>Marketing - BBA, Professional Selling and Sales Management Track</td>
<td>232</td>
</tr>
<tr>
<td>Marketing - BBA, Advertising Strategy Track ..........................</td>
<td>234</td>
</tr>
<tr>
<td>Marketing - BBA, Retail Buying and Management Track ................</td>
<td>235</td>
</tr>
<tr>
<td>Marketing - BBA, Analytics and Consulting Track ......................</td>
<td>236</td>
</tr>
<tr>
<td>Advertising Strategy - Certificate .....................................</td>
<td>237</td>
</tr>
<tr>
<td>Analytics and Consulting - Certificate ..................................</td>
<td>238</td>
</tr>
<tr>
<td>Retail Buying and Management - Certificate ............................</td>
<td>238</td>
</tr>
<tr>
<td>Professional Selling and Sales Management - Certificate ..........</td>
<td>239</td>
</tr>
<tr>
<td>University Studies Programs .............................................</td>
<td>240</td>
</tr>
<tr>
<td>University Studies - BS, Business Concentration .......................</td>
<td>240</td>
</tr>
<tr>
<td>Texas A&amp;M Baylor College of Dentistry ..................................</td>
<td>241</td>
</tr>
<tr>
<td>Caruth School of Dental Hygiene .........................................</td>
<td>242</td>
</tr>
<tr>
<td>Dental Hygiene - BS ........................................................</td>
<td>242</td>
</tr>
<tr>
<td>College of Education and Human Development ..........................</td>
<td>244</td>
</tr>
<tr>
<td>Department of Educational Administration and Human Resource Development</td>
<td>247</td>
</tr>
<tr>
<td>Human Resource Development - BS .......................................</td>
<td>249</td>
</tr>
<tr>
<td>Technology Management - BS ...............................................</td>
<td>250</td>
</tr>
<tr>
<td>Human Resource Development - Minor ....................................</td>
<td>251</td>
</tr>
<tr>
<td>Department of Educational Psychology ...................................</td>
<td>251</td>
</tr>
<tr>
<td>Interdisciplinary Studies - BS, Bilingual Education EC-6 .............</td>
<td>253</td>
</tr>
<tr>
<td>Interdisciplinary Studies - BS, Special Education EC-12 ..............</td>
<td>255</td>
</tr>
<tr>
<td>University Studies - BS, Child Professional Services Non-Certification Program</td>
<td>256</td>
</tr>
<tr>
<td>Creative Studies - Minor ..................................................</td>
<td>257</td>
</tr>
<tr>
<td>Creative Studies - Certificate ...........................................</td>
<td>257</td>
</tr>
<tr>
<td>Department of Health and Kinesiology ...................................</td>
<td>258</td>
</tr>
<tr>
<td>Community Health - BS .....................................................</td>
<td>264</td>
</tr>
<tr>
<td>Health - BS, Allied Health Track .........................................</td>
<td>265</td>
</tr>
<tr>
<td>Health - BS, School Health Track .........................................</td>
<td>266</td>
</tr>
<tr>
<td>Kinesiology - BS, All-Level Physical Education Teacher Certification Track</td>
<td>268</td>
</tr>
<tr>
<td>Kinesiology - BS, Dance Science Track ....................................</td>
<td>269</td>
</tr>
<tr>
<td>Kinesiology - BS, Exercise Science Track, Applied Exercise Physiology Concentration</td>
<td>270</td>
</tr>
<tr>
<td>Kinesiology - BS, Exercise Science Track, Basic Exercise Physiology Concentration</td>
<td>271</td>
</tr>
<tr>
<td>Kinesiology - BS, Exercise Science Track, Motor Behavior Concentration</td>
<td>272</td>
</tr>
<tr>
<td>Sport Management - BS, Internship Track ..................................</td>
<td>274</td>
</tr>
<tr>
<td>Sport Management - BS, Non-internship Track ............................</td>
<td>275</td>
</tr>
<tr>
<td>University Studies - BS, Dance Concentration ..........................</td>
<td>276</td>
</tr>
<tr>
<td>University Studies - BS, Sports Conditioning Concentration ..........</td>
<td>277</td>
</tr>
<tr>
<td>University Studies - BS, Sports Leadership Concentration ..........</td>
<td>278</td>
</tr>
<tr>
<td>Coaching - Minor ............................................................</td>
<td>279</td>
</tr>
<tr>
<td>Dance - Minor ...............................................................</td>
<td>280</td>
</tr>
<tr>
<td>Sport Management - Minor ..................................................</td>
<td>280</td>
</tr>
<tr>
<td>Department of Teaching, Learning and Culture ..........................</td>
<td>280</td>
</tr>
<tr>
<td>Interdisciplinary Studies - BS, Pre-K-6, Generalist Certification ..........</td>
<td>283</td>
</tr>
<tr>
<td>Interdisciplinary Studies, BS, Math/Science, Middle Grades Certification .................................................</td>
<td>284</td>
</tr>
<tr>
<td>Interdisciplinary Studies, BS, English Language Arts/Social Studies, Middle Grades Certification</td>
<td>285</td>
</tr>
<tr>
<td>Secondary Graduate Certification Program ................................</td>
<td>286</td>
</tr>
<tr>
<td>Applied Learning in Science, Technology, Engineering and Mathematics (STEM) Minor .........................................................</td>
<td>287</td>
</tr>
<tr>
<td>University Studies Programs ..............................................</td>
<td>287</td>
</tr>
<tr>
<td>University Studies - BS, Child Professional Services Non-Certification Program</td>
<td>288</td>
</tr>
<tr>
<td>University Studies - BS, Dance Concentration ................................</td>
<td>288</td>
</tr>
<tr>
<td>University Studies - BS, Sport Conditioning Concentration ........</td>
<td>288</td>
</tr>
<tr>
<td>University Studies - BS, Sport Leadership Concentration ..........</td>
<td>288</td>
</tr>
<tr>
<td>Dwight Look College of Engineering ......................................</td>
<td>288</td>
</tr>
<tr>
<td>Biological and Agricultural Engineering - BS ..........................</td>
<td>293</td>
</tr>
<tr>
<td>Department of Aerospace Engineering ....................................</td>
<td>295</td>
</tr>
<tr>
<td>Aerospace Engineering - BS ...............................................</td>
<td>297</td>
</tr>
<tr>
<td>Aerospace Engineering - Minor ............................................</td>
<td>298</td>
</tr>
<tr>
<td>Department of Biomedical Engineering ....................................</td>
<td>298</td>
</tr>
<tr>
<td>Biomedical Engineering - BS ..............................................</td>
<td>299</td>
</tr>
<tr>
<td>Biomedical Engineering - Minor ...........................................</td>
<td>300</td>
</tr>
<tr>
<td>Course Title</td>
<td>Page</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Engineering Therapeutics Manufacturing - Certificate</td>
<td>301</td>
</tr>
<tr>
<td>Quality Engineering for Regulated Medical Technologies - Certificate</td>
<td>301</td>
</tr>
<tr>
<td>Artie McFerrin Department of Chemical Engineering</td>
<td>302</td>
</tr>
<tr>
<td>Chemical Engineering - BS</td>
<td>303</td>
</tr>
<tr>
<td>Chemical Engineering - Minor</td>
<td>305</td>
</tr>
<tr>
<td>Zachry Department of Civil Engineering</td>
<td>305</td>
</tr>
<tr>
<td>Civil Engineering - BS</td>
<td>308</td>
</tr>
<tr>
<td>Civil Engineering, BS - Coastal and Ocean Engineering Track</td>
<td>310</td>
</tr>
<tr>
<td>Civil Engineering - BS, Construction Engineering and Management Track</td>
<td>311</td>
</tr>
<tr>
<td>Civil Engineering - BS, Environmental Engineering Track</td>
<td>313</td>
</tr>
<tr>
<td>Civil Engineering - BS, General Civil Engineering Track</td>
<td>315</td>
</tr>
<tr>
<td>Civil Engineering - BS, Geotechnical Engineering Track</td>
<td>317</td>
</tr>
<tr>
<td>Civil Engineering - BS, Structural Engineering Track</td>
<td>319</td>
</tr>
<tr>
<td>Civil Engineering - BS, Transportation Engineering Track</td>
<td>321</td>
</tr>
<tr>
<td>Civil Engineering - BS, Water Resources Engineering Track</td>
<td>323</td>
</tr>
<tr>
<td>Ocean Engineering - BS</td>
<td>324</td>
</tr>
<tr>
<td>Department of Computer Science &amp; Engineering</td>
<td>326</td>
</tr>
<tr>
<td>Computer Engineering - BS, Computer Science Track</td>
<td>327</td>
</tr>
<tr>
<td>Computer Science - BS</td>
<td>328</td>
</tr>
<tr>
<td>Computer Science - Minor</td>
<td>329</td>
</tr>
<tr>
<td>Department of Electrical &amp; Computer Engineering</td>
<td>329</td>
</tr>
<tr>
<td>Computer Engineering - BS, Electrical Engineering Track</td>
<td>332</td>
</tr>
<tr>
<td>Electrical Engineering - BS</td>
<td>334</td>
</tr>
<tr>
<td>Electrical Engineering - Minor</td>
<td>335</td>
</tr>
<tr>
<td>Department of Engineering Technology and Industrial Distribution</td>
<td>335</td>
</tr>
<tr>
<td>Electronic Systems Engineering Technology - BS</td>
<td>337</td>
</tr>
<tr>
<td>Engineering Technology - BS, Manufacturing and Mechanical Engineering Option</td>
<td>338</td>
</tr>
<tr>
<td>Industrial Distribution - BS</td>
<td>339</td>
</tr>
<tr>
<td>Embedded Systems Integration - Minor</td>
<td>341</td>
</tr>
<tr>
<td>Department of Industrial and Systems Engineering</td>
<td>341</td>
</tr>
<tr>
<td>Industrial Engineering - BS</td>
<td>342</td>
</tr>
<tr>
<td>Industrial Engineering - Minor</td>
<td>343</td>
</tr>
<tr>
<td>Data Center Operations Engineering - Certificate</td>
<td>343</td>
</tr>
<tr>
<td>Engineering Systems Management - Certificate</td>
<td>343</td>
</tr>
<tr>
<td>Department of Materials Science and Engineering</td>
<td>344</td>
</tr>
<tr>
<td>Materials Science and Engineering - Minor</td>
<td>345</td>
</tr>
<tr>
<td>Department of Mechanical Engineering</td>
<td>345</td>
</tr>
<tr>
<td>Mechanical Engineering - BS</td>
<td>348</td>
</tr>
<tr>
<td>Department of Nuclear Engineering</td>
<td>350</td>
</tr>
<tr>
<td>Nuclear Engineering - BS</td>
<td>351</td>
</tr>
<tr>
<td>Radiological Health Engineering - BS</td>
<td>353</td>
</tr>
<tr>
<td>Nuclear Engineering - Minor</td>
<td>354</td>
</tr>
<tr>
<td>Radiological Health Engineering - Minor</td>
<td>354</td>
</tr>
<tr>
<td>Harold Vance Department of Petroleum Engineering</td>
<td>354</td>
</tr>
<tr>
<td>Petroleum Engineering - BS</td>
<td>356</td>
</tr>
<tr>
<td>Petroleum Engineering - Minor</td>
<td>357</td>
</tr>
<tr>
<td>Energy Engineering - Certificate</td>
<td>357</td>
</tr>
<tr>
<td>College of Geosciences</td>
<td>358</td>
</tr>
<tr>
<td>Environmental Geosciences - BS</td>
<td>360</td>
</tr>
<tr>
<td>Environmental Geosciences - 5-Year Bachelor of Science/Master of Science in Oceanography</td>
<td>366</td>
</tr>
<tr>
<td>Climate Change - Minor</td>
<td>369</td>
</tr>
<tr>
<td>Earth Sciences - Minor</td>
<td>369</td>
</tr>
<tr>
<td>Environmental Geosciences - Minor</td>
<td>370</td>
</tr>
<tr>
<td>Diversity - Certificate</td>
<td>371</td>
</tr>
<tr>
<td>Department of Atmospheric Sciences</td>
<td>371</td>
</tr>
<tr>
<td>Meteorology - BS</td>
<td>372</td>
</tr>
<tr>
<td>Meteorology - Minor</td>
<td>373</td>
</tr>
<tr>
<td>Meteorology - 5-Year Bachelor of Science/Master of Science in Oceanography</td>
<td>373</td>
</tr>
<tr>
<td>Department of Geography</td>
<td>375</td>
</tr>
<tr>
<td>Geographic Information Science and Technology - BS, Computation, Design and Analysis Track</td>
<td>376</td>
</tr>
<tr>
<td>Geographic Information Science and Technology - BS, Earth Systems Analysis Track</td>
<td>378</td>
</tr>
<tr>
<td>Geographic Information Science and Technology - BS, Human Systems and Society Track</td>
<td>380</td>
</tr>
<tr>
<td>Geography - BS</td>
<td>382</td>
</tr>
<tr>
<td>Geography - BS, Human Geography Track</td>
<td>384</td>
</tr>
<tr>
<td>Geography - BS, Geography of the Natural Environment Track</td>
<td>386</td>
</tr>
<tr>
<td>Geography - BS, Human-Environment Interactions Track</td>
<td>388</td>
</tr>
<tr>
<td>University Studies - BS, Geographic Information Science and Technology Concentration</td>
<td>390</td>
</tr>
<tr>
<td>University Studies - BS, Geography Concentration</td>
<td>390</td>
</tr>
<tr>
<td>Geographic Information Science and Technology (GIST) - Minor</td>
<td>392</td>
</tr>
<tr>
<td>Geography - Minor</td>
<td>392</td>
</tr>
<tr>
<td>Department of Geology and Geophysics</td>
<td>393</td>
</tr>
<tr>
<td>Geology - BA</td>
<td>393</td>
</tr>
<tr>
<td>Geology - BS, Environmental Geology Track</td>
<td>394</td>
</tr>
</tbody>
</table>
Department of Anthropology

- Gender and Leadership - Certificate
- Liberal Arts Honors - Minor
- Anthropology - Minor
- Geophysics - Minor
- Department of Oceanography
- Oceanography - Minor

University Studies Programs

- University Studies - BS, Geographic Information Science and Technology Concentration
- University Studies - BS, Geography Concentration

College of Liberal Arts

- Women's and Gender Studies - BA
- Africana Studies - Minor
- Comparative Cultural Studies International - Minor
- Comparative Cultural Studies U.S. - Minor
- Film Studies - Minor
- Global Culture and Society - Minor
- Journalism - Minor
- Leadership - Minor
- Liberal Arts Honors - Minor
- Religious Studies - Minor
- Women's Studies - Minor
- Diversity - Certificate
- Gender and Leadership - Certificate
- Global Perspectives in Liberal Arts - Certificate

Department of Anthropology

- Anthropology - BA
- Anthropology - BA, Archaeology Track
- Anthropology - Minor
- Museum Studies - Minor

Department of Communication

- Communication - BA
- Telecommunication Media Studies - BA
- Telecommunication Media Studies - BS
- Communication - Minor
- Communication and Global Media - Certificate
- Communication Leadership and Conflict Management - Certificate

Department of Economics

- Economics - BA
- Economics - BS
- Economics - 5-Year Bachelor of Arts/Master of International Affairs
- Economics - 5-Year Bachelor of Arts/Master of Public Service Administration
- Economics - 5-Year Bachelor of Science/Master of Science in Economics
- Economics - 5-Year Bachelor of Science/Master of International Affairs
- Economics - 5-Year Bachelor of Science/Master of Public Service Administration
- Business Economics - Certificate
- Quantitative Economic Methods - Certificate

Department of English

- English - BA
- English - BA, Middle School Teacher Certification
- English - Minor

Department of Hispanic Studies

- Spanish - BA
- Hispanic Studies for Community Engagement - Minor
- Spanish - Minor

Department of History

- History - BA
- History - Minor

Department of International Studies

- Classics - BA, Classical Civilization Track
- Classics - BA, Language and Literature Track
- International Studies - BA, International Commerce Track
- International Studies - BA, International Communication and Media Track
- International Studies - BA, Environmental Studies Track
- International Studies - BA, International Geographic Information Systems Track
- International Studies - BA, Global Cultural Studies Track
- International Studies - BA, International Politics and Diplomacy Track

Department of Health Communication

- Health Communication - Certificate, Health Campaign/Policy Track
- Health Communication - Certificate, Provider-Patient/Organizational Track
- Strategic Communication - Certificate

Department of Oceanography

- Geophysics - BS, Environmental Geophysics Track
- Geophysics - BS, Petroleum Geophysics Track
- Geology - 5-Year Bachelor of Science/Master of Science in Oceanography
- Geology - Minor
- Geophysics - Minor

Department of Oceanography

- Oceanography - Minor

University Studies Programs

- University Studies - BS, Geographic Information Science and Technology Concentration
- University Studies - BS, Geography Concentration

College of Liberal Arts

- Women's and Gender Studies - BA
- Africana Studies - Minor
- Comparative Cultural Studies International - Minor
- Comparative Cultural Studies U.S. - Minor
- Film Studies - Minor
- Global Culture and Society - Minor
- Journalism - Minor
- Leadership - Minor
- Liberal Arts Honors - Minor
- Religious Studies - Minor
- Women's Studies - Minor
- Diversity - Certificate
- Gender and Leadership - Certificate
- Global Perspectives in Liberal Arts - Certificate

Department of Anthropology

- Anthropology - BA
- Anthropology - BA, Archaeology Track
- Anthropology - Minor
- Museum Studies - Minor

Department of Communication

- Communication - BA
- Telecommunication Media Studies - BA
- Telecommunication Media Studies - BS
- Communication - Minor
- Communication and Global Media - Certificate
- Communication Leadership and Conflict Management - Certificate

Department of Economics

- Economics - BA
- Economics - BS
- Economics - 5-Year Bachelor of Arts/Master of International Affairs
- Economics - 5-Year Bachelor of Arts/Master of Public Service Administration
- Economics - 5-Year Bachelor of Science/Master of Science in Economics
- Economics - 5-Year Bachelor of Science/Master of International Affairs
- Economics - 5-Year Bachelor of Science/Master of Public Service Administration
- Business Economics - Certificate
- Quantitative Economic Methods - Certificate

Department of English

- English - BA
- English - BA, Middle School Teacher Certification
- English - Minor

Department of Hispanic Studies

- Spanish - BA
- Hispanic Studies for Community Engagement - Minor
- Spanish - Minor

Department of History

- History - BA
- History - Minor

Department of International Studies

- Classics - BA, Classical Civilization Track
- Classics - BA, Language and Literature Track
- International Studies - BA, International Commerce Track
- International Studies - BA, International Communication and Media Track
- International Studies - BA, Environmental Studies Track
- International Studies - BA, International Geographic Information Systems Track
- International Studies - BA, Global Cultural Studies Track
- International Studies - BA, International Politics and Diplomacy Track
<table>
<thead>
<tr>
<th>Department</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Studies - 5-Year Bachelor of Arts and Master of International Affairs</td>
<td>467</td>
</tr>
<tr>
<td>Modern Languages - BA, French Option</td>
<td>469</td>
</tr>
<tr>
<td>Modern Languages - BA, German Option</td>
<td>470</td>
</tr>
<tr>
<td>Modern Languages - BA, Russian Option</td>
<td>471</td>
</tr>
<tr>
<td>Arabic Studies - Minor</td>
<td>472</td>
</tr>
<tr>
<td>Asian Studies - Minor</td>
<td>472</td>
</tr>
<tr>
<td>Chinese - Minor</td>
<td>473</td>
</tr>
<tr>
<td>Classical Studies - Minor</td>
<td>473</td>
</tr>
<tr>
<td>French - Minor</td>
<td>474</td>
</tr>
<tr>
<td>German - Minor</td>
<td>474</td>
</tr>
<tr>
<td>Italian - Minor</td>
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Purpose of Catalogs

The Undergraduate and Graduate and Professional catalogs provide information about the academic programs of Texas A&M University to students, prospective students, faculty and staff of the University. Included is information concerning admissions, academic regulations and requirements, services available to students, academic offerings and a list of the administrative officers and faculty of the University. While every effort has been made to make this catalog as complete and accurate as possible, changes may occur at any time in requirements, deadlines, fees, curricula and courses listed in these catalogs.

Students should refer to Howdy, for course offerings in any given semester. For administrative reasons, because of insufficient enrollment or because of limited resources, any given course might not be offered in the announced semester.

This catalog was prepared in advance of its effective date; therefore, the course descriptions may vary from actual course content. The provisions of the catalogs do not constitute a contract, express or implied, between any applicant, student, faculty or staff member of Texas A&M University or The Texas A&M University System. These catalogs are for informational purposes only. The University reserves the right to change or alter any statement herein without prior notice. Neither catalog should be interpreted to allow a student who begins his or her education under either catalog to continue the program under the provisions in that catalog.

Accreditation

Texas A&M University is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award degrees at the baccalaureate, masters, doctorate and professional levels. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia, 30033-4097, or call 404-679-4500, for questions about the accreditation of Texas A&M University.

The agricultural journalism curricula is accredited by the Accrediting Council on Education in Journalism and Mass Communication.

The agricultural systems management curriculum is recognized by the American Society of Agricultural and Biological Engineers.

The dietetic track in the nutritional sciences curriculum and the dietetic internship program are accredited by the Commission on Accreditation for Dietetics Education.

The food science and technology curriculum is approved by the Institute of Food Technologists.

The forensics and investigative sciences program is accredited by the Forensic Science Education Programs Accreditation Commission (FEPAC).

The curriculum in forestry is accredited by the Society of American Foresters and the curriculum in rangeland ecology and management is accredited by the Society for Range Management.

The curriculum in recreation, park and tourism sciences is accredited by the National Recreation and Park Association.

The curriculum in architecture is accredited by the National Architectural Accrediting Board; the curriculum in urban and regional planning is accredited by the Planning Accreditation Board; the curriculum in landscape architecture is accredited by the Landscape Architectural Accreditation Board; and the curriculum in construction science is accredited by the American Council for Construction Education.

The business baccalaureate, master’s, and doctoral programs in Mays Business School are accredited by the Association to Advance Collegiate Schools of Business (AACSB).

Within the Dwight Look College of Engineering, the undergraduate programs in aerospace, biological and agricultural, biomedical, chemical, civil, computer, electrical, industrial, mechanical, nuclear, ocean, petroleum and radiological health engineering are accredited by the Engineering Accreditation Commission of ABET (http://www.abet.org).

The electronic systems engineering technology program and the manufacturing and mechanical engineering technology program are accredited by the Engineering Technology Accreditation Commission of ABET (http://www.abet.org).

The computer science program is accredited by the Computing Accreditation Commission of ABET (http://www.abet.org).

The Master of Public Service and Administration degree in the Bush School of Government and Public Service is accredited by the National Association of Schools of Public Affairs and Administration.

The degree programs in dentistry and dental hygiene and the certificate programs in the ten advanced dental graduate education programs are accredited by the Commission on Dental Accreditation. (CODA)

The medical education degree program is fully accredited by the Liaison Committee on Medical Education.

The nursing degree programs are accredited by the Commission on Collegiate Nursing Education and the Texas Board of Nursing.

The pharmacy professional degree program is accredited by the Accreditation Council for Pharmacy Education.

The School of Public Health degree programs are accredited by the Council on Education for Public Health and the Master of Health Administration is accredited by the Commission on Accreditation of Healthcare Management Education.

Texas A&M University School of Law is accredited by the Council of the Section of Legal Education and Admissions to the Bar of the American Bar Association, 321 N. Clark Street, Chicago, Illinois, 60610, 800-285-2221.

The English Language Institute is accredited by the Commission on English Language Program Accreditation (CEA) (http://cea-accredit.org).

Programs in professional education and degrees conferred by Texas A&M University are approved by the State Board of Educator Certification and the Texas Education Agency for certification purposes.

The clinical psychology program in the Department of Psychology and the counseling psychology and school psychology program in the Department of Educational Psychology are accredited by the American Psychological Association.

The veterinary medicine degree program is accredited by the American Veterinary Medical Association Council on Education.
Other accrediting agencies which have approved programs offered at the university are the American Chemical Society, and the American Society of Agricultural and Biological Engineers.
All dates are subject to change.

**2015 Summer Term I**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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<tbody>
<tr>
<td>May 20</td>
<td>Graduation application opens for all students planning to graduate in August 2015.</td>
</tr>
<tr>
<td>May 25</td>
<td>Memorial Day. Faculty and Staff holiday.</td>
</tr>
<tr>
<td>May 29</td>
<td>Last day to register for first term semester classes, 5 p.m.</td>
</tr>
<tr>
<td></td>
<td>Refer to <a href="http://sbs.tamu.edu">http://sbs.tamu.edu</a> for tuition and fee due dates.</td>
</tr>
<tr>
<td>June 2</td>
<td>First day of first term classes.</td>
</tr>
<tr>
<td>June 5</td>
<td>Last day for adding/dropping courses for the first term, 5 p.m.</td>
</tr>
<tr>
<td>June 22</td>
<td>Last day for all students to drop courses with no penalty (Q-drop) for the first term, 5 p.m.</td>
</tr>
<tr>
<td></td>
<td>Last day to change Kinesiology 198/199 grade type for the first term, 5 p.m.</td>
</tr>
<tr>
<td></td>
<td>Last day to officially withdraw from the University for the first term, 5 p.m.</td>
</tr>
<tr>
<td>July 3</td>
<td>Last day of first term classes.</td>
</tr>
<tr>
<td>July 4</td>
<td>Independence Day.</td>
</tr>
<tr>
<td>July 6</td>
<td>First term final examinations.</td>
</tr>
<tr>
<td>July 9</td>
<td>First term final grades due in the Office of the Registrar, noon.</td>
</tr>
</tbody>
</table>

**2015 Summer Term II**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 20</td>
<td>Graduation application opens for all students planning to graduate in August 2015.</td>
</tr>
<tr>
<td>July 6</td>
<td>Last day to register for the second term semester classes, 5 p.m.</td>
</tr>
<tr>
<td></td>
<td>Refer to <a href="http://sbs.tamu.edu">http://sbs.tamu.edu</a> for tuition and fee due dates.</td>
</tr>
<tr>
<td>July 7</td>
<td>First day of second term classes.</td>
</tr>
<tr>
<td>July 10</td>
<td>Last day for adding/dropping courses for the second term, 5 p.m.</td>
</tr>
<tr>
<td></td>
<td>Last day to apply for degrees to be awarded in August without a late fee.</td>
</tr>
<tr>
<td>July 27</td>
<td>Last day for all students to drop courses with no penalty (Q-drop) for the second term, 5 p.m.</td>
</tr>
<tr>
<td></td>
<td>Last day to change Kinesiology 198/199 grade type for the second term, 5 p.m.</td>
</tr>
<tr>
<td></td>
<td>Last day to officially withdraw from the University for the second term, 5 p.m.</td>
</tr>
<tr>
<td>August 10</td>
<td>Last day of second term classes.</td>
</tr>
<tr>
<td>August 11</td>
<td>Last day to apply for all degrees awarded in August.</td>
</tr>
<tr>
<td>August 13</td>
<td>Second term final examinations for all students.</td>
</tr>
<tr>
<td>August 14</td>
<td>Grades for degree candidates from departments due in Office of the Registrar, noon.</td>
</tr>
<tr>
<td>August 17</td>
<td>Commencement and Commissioning.</td>
</tr>
<tr>
<td>August 18</td>
<td>Last day for August undergraduate degree candidates to apply for Tuition Rebate, 5 p.m.</td>
</tr>
<tr>
<td>August 19</td>
<td>Texas A&amp;M University at Galveston Commencement.</td>
</tr>
</tbody>
</table>

**2015 10-Week Summer Semester**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>May 20</td>
<td>Graduation application opens for all students planning to graduate in August 2015.</td>
</tr>
<tr>
<td>May 25</td>
<td>Memorial Day. Faculty and Staff holiday.</td>
</tr>
<tr>
<td>May 29</td>
<td>Last day to register for 10-week semester classes, 5 p.m.</td>
</tr>
<tr>
<td></td>
<td>Refer to <a href="http://sbs.tamu.edu">http://sbs.tamu.edu</a> for tuition and fee due dates.</td>
</tr>
<tr>
<td>June 2</td>
<td>First day of 10-week semester classes.</td>
</tr>
<tr>
<td>June 5</td>
<td>Last day for adding/dropping courses for the 10-week semester, 5 p.m.</td>
</tr>
<tr>
<td>July 4</td>
<td>Independence Day.</td>
</tr>
<tr>
<td>July 6</td>
<td>No 10-week semester classes.</td>
</tr>
<tr>
<td>July 10</td>
<td>Last day to apply for degrees to be awarded in August without a late fee.</td>
</tr>
<tr>
<td>July 21</td>
<td>Last day for all students to drop courses with no penalty (Q-drop) for the 10-week semester, 5 p.m.</td>
</tr>
<tr>
<td></td>
<td>Last day to officially withdraw from the University for the 10-week semester, 5 p.m.</td>
</tr>
<tr>
<td>August 10</td>
<td>Last day of 10-week semester classes.</td>
</tr>
<tr>
<td>August 11-12</td>
<td>10-week semester final examinations for all students.</td>
</tr>
<tr>
<td>August 13</td>
<td>Grades for degree candidates from departments due in Office of the Registrar, noon.</td>
</tr>
<tr>
<td>August 14</td>
<td>Commencement and Commissioning.</td>
</tr>
<tr>
<td>August 15</td>
<td>Last day for August undergraduate degree candidates to apply for Tuition Rebate, 5 p.m.</td>
</tr>
<tr>
<td>August 17</td>
<td>Texas A&amp;M University at Galveston Commencement.</td>
</tr>
</tbody>
</table>

**2015 Fall Semester**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 19</td>
<td>Graduation application opens for all students planning to graduate in December 2015.</td>
</tr>
<tr>
<td>August 28</td>
<td>Last day to register for fall semester classes, 5 p.m.</td>
</tr>
<tr>
<td></td>
<td>Refer to <a href="http://sbs.tamu.edu">http://sbs.tamu.edu</a> for tuition and fee due dates.</td>
</tr>
<tr>
<td>August 31</td>
<td>First day of fall semester classes.</td>
</tr>
<tr>
<td>September 4</td>
<td>Last day for adding/dropping courses for the fall semester, 5 p.m.</td>
</tr>
<tr>
<td>September 30</td>
<td>Undergraduate Degree Plan approval deadline.</td>
</tr>
<tr>
<td>October 2</td>
<td>Last day to apply for degrees to be awarded in December without a late fee.</td>
</tr>
<tr>
<td>October 19</td>
<td>Mid-semester grades due in Office of the Registrar, noon.</td>
</tr>
<tr>
<td>November 12 - December 2</td>
<td>Preregistration for 2016 spring semester.</td>
</tr>
<tr>
<td>November 18</td>
<td>Bonfire 1999 Remembrance Day.</td>
</tr>
</tbody>
</table>
November 20
- Last day for all students to drop courses with no penalty (Q-drop) for the first term, 5 p.m.
- Last day to change Kinesiology 198/199 grade type for the first term, 5 p.m.
- Last day to officially withdraw from the University for the first term, 5 p.m.

November 26-27
- Thanksgiving holiday.

December 7
- Redefined day, students attend their Friday classes.
- No regular course examinations (except for laboratory and one-hour courses) shall be given. Does not apply to programs offered by the College of Nursing.

December 8
- Redefined day, students attend their Thursday classes.
- No regular course examinations (except for laboratory and one-hour courses) shall be given. Does not apply to programs offered by the College of Nursing.

December 9
- Last day of fall semester classes.
- Last day to apply for all degrees to be awarded in December.

December 10
- Reading day, no classes.

December 11-14
- Fall semester final examinations for all students.

December 15
- Last day for adding/dropping courses for the spring semester, 5 p.m.

December 18
- No regular course examinations (except for laboratory and one-hour courses) shall be given.
- Does not apply to programs offered by the College of Nursing.

December 19
- Last day for all students to drop courses with no penalty (Q-drop) for the first term, 5 p.m.
- Last day to change Kinesiology 198/199 grade type for the first term, 5 p.m.
- Last day to officially withdraw from the University for the first term, 5 p.m.

December 21
- Muster. Campus ceremony.

February 19
- Last day for adding/dropping courses for the first term, 5 p.m.

March 25
- Last day to apply for degrees to be awarded in August without a late fee.

July 11
- Last day to apply for degrees to be awarded in August without a late fee.

2016 Spring Semester

January 6
- Graduation application opens for all students planning to graduate in May 2016.

January 15
- Last day to register for spring semester classes, 5 p.m.
- Refer to http://sbs.tamu.edu for tuition and fee due dates.

January 18
- Martin Luther King Jr. Day. Faculty and Staff holiday.

January 19
- First day of spring semester classes.

January 25
- Last day for adding/dropping courses for the spring semester, 5 p.m.

February 19
- Last day to apply for degrees to be awarded in May without a late fee.

March 7
- Mid-semester grades due in Office of the Registrar, noon.

March 14-18
- Spring Break.

March 17-18
- Faculty and Staff holiday.

March 25
- Reading day, no classes.

April 7-22
- Preregistration for 2016 first term, second term, 10-week summer semester and fall semester.

April 19
- Last day for all students to drop courses with no penalty (Q-drop) for the first term, 5 p.m.
- Last day to change Kinesiology 198/199 grade type for the first term, 5 p.m.
- Last day to officially withdraw from the University for the first term, 5 p.m.

April 21
- Muster. Campus ceremony.

May 2
- No regular course examinations (except for laboratory and one-hour courses) shall be given.

May 3
- Last day of spring semester classes.
- Last day to apply for all degrees to be awarded in May.
- Redefined day, students attend their Friday classes.
- No regular course examinations (except for laboratory and one-hour courses) shall be given. Does not apply to programs offered by the College of Nursing.

May 4
- Reading days, no classes.

May 5-10
- Spring semester final examinations for all students.

May 11
- Grades for degree candidates due, 6 p.m.

May 12-14
- Commencement and Commissioning.

May 13
- Last day for May undergraduate degree candidates to apply for Tuition Rebate, 5 p.m.

May 16
- Final grades for all students due in the Office of the Registrar, noon.

2016 Summer Term I

May 18
- Graduation application opens for all students planning to graduate in August 2016.

May 27
- Last day to register for first term semester classes, 5 p.m.
- Refer to http://sbs.tamu.edu for tuition and fee due dates.

May 30
- Memorial Day. Faculty and Staff holiday.

May 31
- First day of first term classes.

June 3
- Last day for adding/dropping courses for the first term, 5 p.m.

June 20
- Last day for all students to drop courses with no penalty (Q-drop) for the first term, 5 p.m.
- Last day to change Kinesiology 198/199 grade type for the first term, 5 p.m.
- Last day to officially withdraw from the University for the first term, 5 p.m.

July 1
- Last day of first term classes.

July 4
- Independence Day.

July 5
- First term final examinations.

July 8
- First term final grades due in the Office of the Registrar, noon.

July 11
- Last day to apply for degrees to be awarded in August without a late fee.

2016 Summer Term II

May 18
- Graduation application opens for all students planning to graduate in August 2016.

July 5
- Last day to register for the second term semester classes, 5 p.m.
- Refer to http://sbs.tamu.edu for tuition and fee due dates.

July 6
- First day of second term classes.

July 11
- Last day for adding/dropping courses for the second term, 5 p.m.
- Last day to apply for degrees to be awarded in August without a late fee.
July 26
Last day for all students to drop courses with no penalty (Q-drop) for the second term, 5 p.m.
Last day to change Kinesiology 198/199 grade type for the second term, 5 p.m.
Last day to officially withdraw from the University for the second term, 5 p.m.

August 8
Last day of second term classes.
Last day to apply for all degrees awarded in August.

August 9
Second term final examinations for all students.

August 11
Grades for degree candidates from departments due in Office of the Registrar, noon.

August 12
Commencement and Commissioning.
Last day for August undergraduate degree candidates to apply for Tuition Rebate, 5 p.m.

August 13
Texas A&M University at Galveston Commencement.

August 15
Final grades for second term due in Office of the Registrar, noon.

2016 10-Week Summer Semester

May 18
Graduation application opens for all students planning to graduate in August 2015.

May 27
Last day to register for 10-week semester classes, 5 p.m.
Refer to http://sbs.tamu.edu for tuition and fee due dates.

May 30
Memorial Day. Faculty and Staff holiday.

May 31
First day of 10-week semester classes.

June 3
Last day for adding/dropping courses for the 10-week semester, 5 p.m.

July 4
Independence Day.

July 5
No 10-week semester classes.

July 11
Last day to apply for degrees to be awarded in August without a late fee.

July 20
Last day for all students to drop courses with no penalty (Q-drop) for the 10-week semester, 5 p.m.
Last day to officially withdraw from the University for the 10-week semester, 5 p.m.

August 8
Last day of 10-week semester classes.
Last day to apply for all degrees awarded in August.

August 9-10
10-week semester final examinations for all students.

August 11
Grades for degree candidates from departments due in Office of the Registrar, noon.

August 12
Commencement and Commissioning.

August 13
Texas A&M University at Galveston Commencement.

August 15
Final grades for 10-week semester due in Office of the Registrar, noon.

2016

June 8
Summer clinic begins.

June 9
QA/RM Program (D3-D4 and DH Sr.) – clinics closed from 1:00 p.m. – 4:00 p.m.

June 11
4th class day – census date – DDS and DH.

June 24
Graduate students – tuition and fee payment due by 5 p.m.

June 25-26
New Graduate Student Orientation.

June 26
15th class day – DDS and DH.

June 29
Summer graduate session begins.

June 30
Graduate Core Courses begin.

July 2
4th class day – census date - Graduates.

July 4
Independence Day. Holiday.

July 17
Summer clinic ends, Dental and Dental Hygiene.

July 20
15th class day – Graduates.

July 21
Summer session grades due by noon – Dental and Dental Hygiene courses.

August 12
DDS (D1,D2) DH1, DH2, Graduate students – tuition and fee payment due by 5 p.m.

August 10-14
Monday – Friday 8:30 a.m., Orientation, fall semester first year Dental and Dental Hygiene students.

August 10
First year dental registration.

August 14
Second year Dental DDS Instrument Distribution (ATTENDANCE MANDATORY).

August 14
Summer graduate session ends.

August 17
Fall semester begins, 8 a.m.

August 18
Summer graduate grades due by noon.

September 1
12th class day – census date – all students.

September 7
Labor Day. Holiday.

September 14
20th class day.

November 23-27
Fall semester recess.

November 26
Thanksgiving Day. Holiday.

December 11
Fall semester instruction ends.

December 14-18
Fall semester examination period.

December 18
Holiday recess begins, 5 p.m.

December 19
Award MS and PhD degrees.

December 25
Christmas Day. Holiday.

2015

June 3
DDS (D3, D4), DH2 students – tuition and fee payment due by 5 p.m.

Texas A&M Baylor College of Dentistry Academic Calendar

2015

June 3
DDS (D3, D4), DH2 students – tuition and fee payment due by 5 p.m.

January 1
New Year's Day. Holiday.

January 5
Fall semester grades due by noon.

January 6
DDS (All), DH1, DH2, Graduate students – tuition and fee payment due by 5 p.m.

January TBD
Faculty Retreat.

January 11
Spring semester begins, 8 a.m.

January 18
Martin Luther King Jr. Day. Holiday.

January 27
12th class day – census date – all students.

February TBD
Mock Boards – fourth year Dental (TBD).

February 8
20th class day.

March 14-18
Spring semester recess.

March 19
Last day to submit final approved copies of thesis.

April TBD
Scholars Day – clinic closed for DDS/DH.

April-May TBD
WREB Exam – fourth year and Senior Dental Hygiene (TBD).
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<tr>
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<tr>
<td>May 13</td>
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</tr>
<tr>
<td></td>
<td>Spring semester instruction ends, 5 p.m.</td>
</tr>
<tr>
<td>May 16-20</td>
<td>Spring semester examination period (except graduating students).</td>
</tr>
<tr>
<td>May 17</td>
<td>Graduation announcement for graduating students.</td>
</tr>
<tr>
<td>May 20</td>
<td>Graduate semester ends.</td>
</tr>
<tr>
<td>May TBD</td>
<td>Awards ceremony (TBD).</td>
</tr>
<tr>
<td>May TBD</td>
<td>Graduation exercise (TBD).</td>
</tr>
<tr>
<td>May 24</td>
<td>Spring semester grades due for all other students by noon.</td>
</tr>
<tr>
<td>May 30</td>
<td>Memorial Day, Holiday.</td>
</tr>
</tbody>
</table>

1 Graduate specialty students clinical rotations continue between academic terms with no change in student status.
Board of Regents and Administrative Officers

Board of Regents

Cliff Thomas, Chairman - Victoria
Elaine Mendoza, Vice Chairman - San Antonio
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Vice President and Associate Provost for Diversity - Christine A. Stanley
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Vice President and CEO, Texas A&M University at Galveston - Robert Smith, III
Dean of Faculties and Associate Provost (interim) - Blanca Lupiani
Associate Provost for Graduate and Professional Studies - Karen Butler-Purry
Associate Provost for Undergraduate Studies - Ann L. Kenimer
Associate Provost for Academic Initiatives - Michael T. Stephenson
Associate Vice President for Academic Services - Joseph P. Pettibon, II
General Information

The following types of information can be found within the General Information section of the catalog:

**History and Development** (p. 18)
Mission Statement; History and Development

**University Core Curriculum** (p. 19)

**Student Learning Outcomes** (p. 24)

**Degree Information** (p. 24)
Which Catalog to Follow; Degrees Offered; Requirements for a Baccalaureate Degree; Undergraduate Minor Programs; Two Degrees; Baccalaureate Degree Option for Students Granted Early Admission to Medical/Professional Programs; 3 + 3 Program for Early Admission to South Texas College of Law; Graduation with Honors; Graduation Application, Diploma and Commencement; Tuition Charged for Excess Credit Hours; Undergraduate Certificate Programs; International and Cultural Diversity Requirements

**Admission** (p. 39)
Application Information; Items Necessary to Complete an Application File; Notification of Application Status; Required Coursework; State of Texas Uniform Admission Policy; Additional Information for Freshman Applicants; Freshman Admissions; Information for all Freshman Applicants; Notice of Admission Decision; Suspected Fraudulent Admission Applications; Transfer Admissions; Notification of Admission Decisions; Transfer Course Credit Policies; International Admission Criteria; Admission Criteria for Other Application Types; Academic Fresh Start Policy; Entry to a Major – Dwight Look College of Engineering; Upper-Level Entry into Colleges of Architecture, Business and Veterinary Medicine and Biomedical Sciences—Biomedical Science; Course Credit; Baylor College of Dentistry (Health Science Center) – Caruth School of Dental Hygiene; College of Nursing (Health Science Center); Texas A&M University at Galveston; Graduate Admission; Senior Citizens

**Registration and Academic Status** (p. 66)
Full-Time Student; Undergraduates Registering for Graduate Courses; VA Benefits; Maximum Schedule; Classification; Academic Status

**Grading System** (p. 68)

**Housing** (p. 70)
Adult, Graduate and Off Campus Student Services; On-Campus Housing; University Apartments (The Gardens)

**Orientation** (p. 71)
Aggie Honor System Office; ExCEL Program; Fish Camp; Howdy Camp; New Student Conferences; Transfer Camp (T-Camp)

**Services for Students** (p. 72)
Academic Advising; Academic Success Center; The Association of Former Students; Career Center; Disability Services; Gay, Lesbian, Bisexual, Transgender (GLBT) Resource Center; George Bush Presidential Library and Museum; Health Promotion; Human Resources; International Student Services; Professional School Advising; Sponsored Student Programs; Student Conduct Services; Student Counseling Service; Student Health Services; Student Legal and Mediation Services; Technology Resources; University Libraries; University Police; University Writing Center; Veteran Resource and Support Center (VRSC); Veteran Services Office (Scholarships & Financial Aid); Division for Rehabilitation Services (Vocational Rehabilitation); Women's Resource Center (WRC)

**Campus Life** (p. 75)
The Corps Experience; Department of Multicultural Services; Fraternity and Sorority Life; Intercollegiate Athletics; Memorial Student Center (MSC); Musical Activities; Recreational Sports; Speech and Debate Team; Student Activities; Student Government (SGA); Student Life; Student Life Studies; Student Media; University Art Galleries; University Center and Special Events (UCEN); Vice President for Student Affairs

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**History and Development**

**Mission Statement**
Texas A&M University (Texas A&M) is dedicated to the discovery, development, communication and application of knowledge in a wide range of academic and professional fields. Its mission of providing the highest quality undergraduate and graduate programs is inseparable from its mission of developing new understandings through research and creativity. It prepares students to assume roles in leadership, responsibility and service to society. Texas A&M assumes as its historic trust the maintenance of freedom of inquiry and an intellectual environment nurturing the human mind and spirit. It welcomes and seeks to serve persons of all racial, ethnic and geographic groups, women and men alike, as it addresses the needs of an increasingly diverse population and a global economy. In the twenty-first century, Texas A&M University seeks to assume a place of preeminence among public universities while respecting its history and traditions.

**History and Development**
Texas A&M University, the state’s first public institution of higher education, opened for classes in 1876. It is now one of a select few institutions in the nation to hold land grant, sea grant and space grant designations. It is also one of the few universities to host a presidential library. The George Bush Presidential Library and Museum opened in 1997 on a 90-acre tract of land on the west side of campus. The University owes its origin to the Morrill Act approved by the Congress on July 2, 1862. This act provided for donation of public land to the states. The land was to be sold at auction, and the proceeds were set aside in a perpetual fund. The act directed that interest from this fund be used to support a college whose “leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and mechanic arts... in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life.”

By resolution of the Legislature of the State of Texas in November 1866, Texas agreed to provide for a college under the terms of the Morrill Act, but no such institution was organized until the establishment of the Agricultural and Mechanical College of Texas by act of the Twelfth Texas Legislature on April 17, 1871. The same act appropriated $75,000 for the erection of buildings and bound the state to defray all expenses of the college exceeding the annual interest from the endowment. Proceeds from the sale of the 180,000 acres of land scrip received under the Land Grant College Act were invested in $174,000 of gold frontier defense bonds to Texas, forming a perpetual endowment for the institution. A commission
created to locate the institution accepted the offer of 2,416 acres of land from the citizens of Brazos County in 1871, and instruction began in 1876.

As the State of Texas grew, so did its land grant institution. Texas A&M now has a physical plant valued at more than $1 billion. The campus in College Station includes 5,200 acres and is one of the largest campuses of any major institution of higher education in the nation. The University also operates branch campuses at Galveston and Doha, Qatar, with the latter operating at no expense to the State of Texas. Additionally, the University operates the Soltis Center for Research and Education in San Isidro de Peñas Blancas, Costa Rica. The University also supports global activities for students at the Santa Chiara Study Center in Castiglion Fiorentino, Arezzo, Italy, and maintains an office in Mexico City.

In keeping with the diversified and expanded character of the institution, the 58th Legislature of Texas, on August 23, 1963, changed the name of the Agricultural and Mechanical College of Texas to Texas A&M University.

On September 17, 1971, the designation “sea grant college” was assigned to Texas A&M University in recognition of its achievements in oceanographic and marine resources development. Texas A&M was one of the first four institutions nationwide to achieve this distinction. Patterned after the century-old land grant idea, sea grant colleges are federal-state partnerships for furthering marine work through practical research, education and advisory services. The designation clearly establishes the University’s leadership relative to marine affairs of the state.

Texas A&M added a third special designation to its credentials on August 31, 1989, when it was named a “space grant college.” This new designation, bestowed by the National Aeronautics and Space Administration, came to the University based on its continuing commitment to space research and its participation in the Texas Space Grant Consortium, a group of 35 institutions that includes universities, industrial organizations, non-profit organizations and government agencies within Texas under the leadership of Texas A&M University, The University of Texas at Austin and the University of Houston.

In addition to its traditional strengths in agriculture and engineering, Texas A&M has established itself as a leader in such newer technological areas as the space, nuclear, computer, biotechnological, oceanographic and marine resources fields. It also has placed added emphasis on the arts and sciences and business and continues to enhance its prominent role in these fields.

A mandatory military component was a part of the Land Grant designation until the 1950s, and the Corps of Cadets has played an important role in the history and development of Texas A&M. Even though membership in the Corps of Cadets became voluntary in 1965, Texas A&M historically has produced more officers than any other institution in the nation with the exception of the service academies. The University is one of only three institutions with a full-time corps of cadets including ROTC programs leading to commissions in all branches of service — Army, Air Force, Navy, Marine Corps and Coast Guard.

Texas A&M offers a variety of programs in both undergraduate and graduate studies through its academic colleges and schools supported by the Texas A&M University Libraries — Agriculture and Life Sciences, Architecture, The Bush School of Government and Public Service, Mays Business School, Education and Human Development, Dwight Look College of Engineering, Geosciences, Liberal Arts, Science, and Veterinary Medicine and Biomedical Sciences. Texas A&M University at Galveston is the marine and maritime branch campus of Texas A&M University, and Texas A&M University at Qatar offers degrees in engineering. In addition, Texas A&M’s extensive research efforts in all fields, in conjunction with agricultural and engineering experiment stations, resulted in annual expenditures of approximately $630 million in 2009, which consistently rank in the top tier of research institutions by the National Science Foundation.

Classified by the Carnegie Foundation as a Research University (very high research activity), Texas A&M embraces its mission of the advancement of knowledge and human achievement in all its dimensions. The research mission is a key to advancing economic development in both public and private sectors. Integration of research with teaching prepares students to compete in a knowledge-based society and to continue developing their own creativity, learning, and skills beyond graduation.

In 2001, Texas A&M University was admitted to the Association of American Universities (AAU), the prestigious organization founded in 1900 that restricts its ranks to the nation’s premier public and private institutions of higher learning. In 2004, the Kappa of Texas Chapter of Phi Beta Kappa was installed at Texas A&M University.

**University Core Curriculum**

The Texas A&M Core Curriculum, in compliance with the Texas Core Curriculum, provides students with a foundation of knowledge of human cultures and the physical and natural world, develops principles of personal and social responsibility for living in a diverse world, and advances intellectual and practical skills that are essential for all learning. The Core Curriculum enhances the individual degree program and university graduation requirements, and all three areas must be met by every student.

Given the rapid evolution of necessary knowledge and skills and the need to take into account global, national, state, and local cultures, the core curriculum ensures that students will develop the essential knowledge and skills they need to be successful in college, in a career, in their communities, and in life. The core curriculum acts to enrich and broaden the University’s tradition of providing thorough preparation in each student’s academic major and preparing students for a lifetime of learning.

The University Core Curriculum requirements are described in the section that follows. These requirements must be met by every student entering Texas A&M University on or after the 2014 fall semester. Students entering earlier will be guided by the core curriculum in the catalog upon which they entered the university. Individual degree programs may require that specific courses from the core curriculum be used to satisfy core curriculum requirements. Please check with individual program advisors for details. Students transferring course credit to satisfy the Core Curriculum requirements should refer to the Texas Common Course Numbering System (p. 1094).

The core curriculum focuses on the development of six skills that have been shown to be effective in preparing students for the job market and their role in a diverse world and democratic society.

- **Critical Thinking Skills** – to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information.
- **Communication Skills** – to include effective development, interpretation and expression of ideas through written, oral and visual communication.
- **Empirical and Quantitative Skills** – to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions.
• **Teamwork** – to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal.

• **Personal Responsibility** – to include the ability to connect choices, actions and consequences to ethical decision-making.

• **Social Responsibility** – to include intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national, and global communities.

Students develop and practice these skills in the context of 42 semester credit hours assigned to eight Foundational Component Areas, each made up of a selection of courses that meet the definition provided by the Texas Core Curriculum. For additional information, please reference http://core.tamu.edu.

### Communication - 6 SCH

- **COMM 203** Public Speaking
- **COMM 205** Communication for Technical Professions
- **COMM 243** Argumentation and Debate
- **ENGL 103** Introduction to Rhetoric and Composition
- **ENGL 104** Composition and Rhetoric
- **ENGL 203** Writing about Literature
- **ENGL 210** Technical and Business Writing
- **THAR 407** Performing Literature.

Courses in this category focus on developing ideas and expressing them clearly, considering the effective of the message, fostering understanding, and building the skills needed to communicate persuasively. Courses involve the command of oral, aural, written, and visual literacy skills that enable people to exchange messages appropriate to the subject, occasion, and audience. The following skills will be addressed in the courses that comprise this area: critical thinking, communication, team work, and personal responsibility.

### Mathematics – 6 SCH

- **MATH 131** Mathematical Concepts—Calculus
- **MATH 141** Business Mathematics I
- **MATH 142** Business Mathematics II
- **MATH 147** Calculus I for Biological Sciences
- **MATH 148** Calculus II for Biological Sciences
- **MATH 150** Functions, Trigonometry and Linear Systems
- **MATH 151** Engineering Mathematics I
- **MATH 152** Engineering Mathematics II
- **MATH 166** Topics in Contemporary Mathematics
- **MATH 167** For All Practical Purposes
- **MATH 171** Analytic Geometry and Calculus
- **MATH 172** Calculus
- **PHIL 240** Introduction to Logic

Courses in this category focus on quantitative literacy in logic, patterns, and relationships. Courses involve the understanding of key mathematical concepts and the application of appropriate quantitative tools to everyday experiences. The following skills will be addressed in the courses that comprise this area: critical thinking, communication, and empirical and quantitative.

### Life and Physical Sciences – 9 SCH

- **ANSC 107** General Animal Science
- **ANTH 225** Introduction to Biological Anthropology
- **ASTR 101** Basic Astronomy
- **ASTR 102** Observational Astronomy
- **ASTR 109/PHYS 109** Big Bang and Black Holes
- **ASTR 111** Overview of Modern Astronomy
- **ASTR 119/PHYS 119** Big Bang and Black Holes: Laboratory Methods
- **ATMO 201** Weather and Climate
- **ATMO 202** Weather and Climate Laboratory
- **BESC 201** Introduction to Bioenvironmental Sciences
- **BESC 204** Molds and Mushrooms: The Impact of Fungi on Society and the Environment
- **BIOC 101** Botany
- **BIOC 107** Zoology
- **BIOC 111** Introductory Biology I
- **BIOC 112** Introductory Biology II
- **BIOC 113** Essentials in Biology
- **CHEM 101** Fundamentals of Chemistry I
- **CHEM 102** Fundamentals of Chemistry II
- **CHEM 106** Molecular Science for Citizens
- **CHEM 107** General Chemistry for Engineering Students
- **CHEM 111** Fundamentals of Chemistry Laboratory I
- **CHEM 112** Fundamentals of Chemistry Laboratory II
- **CHEM 116** Molecular Science for Citizens Laboratory
- **CHEM 117** General Chemistry for Engineering Students Laboratory
- **ENGR 101** Energy: Resources, Utilization and Importance to Society
- **ENTO 322** Insects and Human Society
- **ESSM 309** Forest Ecology
- **FIVS 123** Forensic Investigations
- **GEOG 203** Planet Earth
- **GEOG 205** Environmental Change
- **GEOG 213** Planet Earth Lab
- **GEOL 101** Principles of Geology
- **GEOL 106** Historical Geology
- **GEOS 210** Climate Change
- **HORT 201** Horticultural Science and Practices
- **HORT 202** Horticultural Science and Practices Laboratory
- **KINE 120** The Science of Basic Health and Fitness
- **KINE 223** Introduction to the Science of Health and Fitness
- **NUTR 222** Nutrition for Health and Health Care
- **OCNG 251** Oceanography
- **OCNG 252** Oceanography Laboratory
- **PHYS 109/ASTR 109** Big Bang and Black Holes
- **PHYS 119/ASTR 119** Big Bang and Black Holes: Laboratory Methods
- **PHYS 201** College Physics
- **PHYS 202** College Physics
Courses in this category focus on describing, explaining, and predicting natural phenomena using the scientific method. Courses involve the understanding of interactions among natural phenomena and the implications of scientific principles on the physical world and on human experiences. The following skills will be addressed in the courses that comprise this area: critical thinking, communication, empirical and quantitative, and team work.

### Language, Philosophy and Culture – 3 SCH

| AFST 204/ENGL 204 | Introduction to African-American Literature | 3 |
| AFST 345/HIST 345 | Modern Africa | 3 |
| ANTH 204 | Peoples and Cultures of the Ancient World | 3 |
| ANTH 205 | Peoples and Cultures of the World | 3 |
| ANTH 210 | Social and Cultural Anthropology | 3 |
| ANTH 316 | Nautical Archaeology | 3 |
| ANTH 317/RELS 317 | Introduction to Biblical Archaeology | 3 |
| ARAB 201 | Intermediate Arabic I | 3 |
| ARAB 202 | Intermediate Arabic II | 3 |
| ARCH 213 | Sustainable Architecture | 3 |
| CARC 331 | Field Studies in Design Philosophy | 3 |
| CHIN 201 | Intermediate Chinese I | 3 |
| CHIN 202 | Intermediate Chinese II | 3 |
| CLAS 220 | History of Christianity: Origins to the Reformation | 3 |
| CLAS 221 | Intermediate Latin I | 3 |
| CLAS 222 | Intermediate Latin II | 3 |
| CLAS 250 | Greek and Roman Civilization | 3 |
| CLAS 251/RELS 251 | Classical Mythology | 3 |
| CLAS 429/HIST 429 | The Roman Empire | 3 |
| COMM 301 | Rhetoric in Western Thought | 3 |
| COMM 327 | American Oratory | 3 |
| ENGL 202 | Environmental Literature | 3 |
| ENGL 204/AFST 204 | Introduction to African-American Literature | 3 |
| ENGL 206 | Twenty-first Century Literature and Culture | 3 |
| ENGL 221/MODL 221 | World Literature | 3 |
| ENGL 222/MODL 222 | World Literature | 3 |
| ENGL 227 | American Literature: The Beginnings to Civil War | 3 |
| ENGL 228 | American Literature: Civil War to Present | 3 |
| ENGL 231 | Survey of English Literature I | 3 |
| ENGL 232 | Survey of English Literature II | 3 |
| ENGL 330 | Arthurian Literature | 3 |
| ENGL 333/WMST 333 | Gay and Lesbian Literature | 3 |
| ENGL 334 | Science Fiction Present and Past | 3 |
| ENGL 338 | American Ethnic Literature | 3 |
| ENGL 360 | Literature for Children | 3 |
| ENGL 362/HISP 362 | Latino/a Literature | 3 |
| ENGL 365/RELS 360 | The Bible as Literature | 3 |
| ENGL 374/WMST 374 | Women Writers | 3 |
| ENGL 376 | The American Novel Since 1900 | 3 |
| ENGR 482/PHIL 482 | Ethics and Engineering | 3 |
| FREN 201 | Intermediate French I | 3 |
| FREN 202 | Intermediate French II | 3 |
| FSTC 300/NUTR 300 | Religious and Ethnic Foods | 3 |
| GEOG 202 | Geography of the Global Village | 3 |
| GEOG 301 | Geography of the United States | 3 |
| GEOG 305 | Geography of Texas | 3 |
| GERM 201 | Intermediate German I | 3 |
| GERM 202 | Intermediate German II | 3 |
| HISP 206 | Food in the Hispanic World | 3 |
| HISP 362/ENGL 362 | Latino/a Literature | 3 |
| HIST 101 | Western Civilization to 1660 | 3 |
| HIST 102 | Western Civilization Since 1660 | 3 |
| HIST 103 | World History to 1500 | 3 |
| HIST 104 | World History Since 1500 | 3 |
| HIST 210 | Russian Civilization | 3 |
| HIST 213 | History of England | 3 |
| HIST 214 | History of England | 3 |
| HIST 220 | History of Christianity: Origins to the Reformation | 3 |
| HIST 221/RELS 221 | History of Islam | 3 |
| HIST 234 | European Military History, 1630-1900 | 3 |
| HIST 345/AFST 345 | Modern Africa | 3 |
| HIST 347/RELS 347 | Rise of Islam, 600-1258 | 3 |
| HIST 429/CLAS 429 | The Roman Empire | 3 |
| INTS 251 | Contemporary Issues in the Middle East | 3 |
| ITAL 201 | Intermediate Italian I | 3 |
| ITAL 202 | Intermediate Italian II | 3 |
| JAPN 201 | Intermediate Japanese I | 4 |
| JAPN 202 | Intermediate Japanese II | 4 |
| LAND 240 | History of Landscape Architecture | 3 |
MODL 221/ ENGL 221 World Literature 3  
MODL 222/ ENGL 222 World Literature 3  
MUSC 201 Music and the Human Experience 3  
MUSC 227 Popular Music of India 3  
MUSC 325/ ENGL 325 Dance and World Cultures 3  
PERF 325  
MUSC 326 Dance and Identity in the United States 3  
NUTR 300/ FSTC 300 Religious and Ethnic Foods 3  
PERF 325/ MUSC 325 Dance and World Cultures 3  
MUSC 325  
PERF 326 Dance and Identity in the United States 3  
PHIL 111 Contemporary Moral Issues 3  
PHIL 251 Introduction to Philosophy 3  
PHIL 482/ ENGR 482 Ethics and Engineering 3  
RELS 220 History of Christianity: Origins to the Reformation 3  
RELS 221/ HIST 221 History of Islam 3  
RELS 251/ CLAS 251 Classical Mythology 3  
RELS 312 Contemplative Practices in the Modern World 3  
RELS 317/ ANTH 317 Introduction to Biblical Archaeology 3  
RELS 347/ HIST 347 Rise of Islam, 600-1258 3  
RELS 360/ ENGL 365 The Bible as Literature 3  
RUSS 201 Intermediate Russian I 3  
RUSS 202 Intermediate Russian II 3  
SPAN 201 Intermediate Spanish I 3  
SPAN 202 Intermediate Spanish II 3  
SPMT 220 Olympic Studies 3  
THAR 155 History of Western Dress 3  
THAR 156 Dress, Culture and Society 3  
THAR 280 History of the Theatre I 3  
THAR 281 History of the Theatre II 3  
WGST 200 Introduction to Women's and Gender Studies 3  
WGST 333/ ENGL 333 Gay and Lesbian Literature 3  
WGST 374/ ENGL 374 Women Writers 3

Courses in this category focus on how ideas, values, beliefs, and other aspects of culture express and affect human experience. Courses involve the exploration of ideas that foster aesthetic and intellectual creation in order to understand the human condition across cultures. The following skills will be addressed in the courses that comprise this area: critical thinking, communication, social responsibility, and personal responsibility.

### Creative Arts – 3 SCH

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>AFST 327</td>
<td>Popular Musics in the African Diaspora</td>
<td>3</td>
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<tr>
<td>ANTH 324/</td>
<td>Music in World Cultures</td>
<td>3</td>
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<tr>
<td>MUSC 324</td>
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<tr>
<td>ARCH 249</td>
<td>Survey of World Architecture History I</td>
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<tr>
<td>ARCH 250</td>
<td>Survey of World Architecture History II</td>
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<tr>
<td>ARCH 350</td>
<td>History and Theory of Modern and Contemporary Architecture</td>
<td>3</td>
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<tr>
<td>ARTS 149</td>
<td>Art History Survey I</td>
<td>3</td>
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<tr>
<td>ARTS 150</td>
<td>Art History Survey II</td>
<td>3</td>
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<tr>
<td>CARC 311</td>
<td>Field Studies in Design Communication</td>
<td>3</td>
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<tr>
<td>DCED 202</td>
<td>Dance Appreciation</td>
<td>3</td>
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<tr>
<td>ENDS 101</td>
<td>Design Process</td>
<td>3</td>
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<td>ENDS 115</td>
<td>Design Communication Foundations</td>
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<tr>
<td>ENGL 212</td>
<td>Shakespeare</td>
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<td>ENGL 219</td>
<td>Literature and the Other Arts</td>
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<td>ENGL 251/</td>
<td>Introduction to Film Analysis</td>
<td>3</td>
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<td>FILM 251</td>
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<td>FILM 425/</td>
<td>French Film</td>
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<td>FREN 425</td>
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<td>FREN 425/</td>
<td>French Film</td>
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<td>FILM 425</td>
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<td>HISP 204</td>
<td>Spanish and Spanish American Literature in</td>
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<td></td>
<td>Translation</td>
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<td>HISP 205</td>
<td>Don Quixote and the Other Arts</td>
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<td>HORT 203</td>
<td>Floral Design</td>
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<td>KINE 311</td>
<td>Fundamental Rhythms and Dance</td>
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<tr>
<td>MUSC 221</td>
<td>Guitar Heroes</td>
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<td>MUSC 222</td>
<td>Music of the Americas</td>
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<tr>
<td>MUSC 225</td>
<td>History of Jazz</td>
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<td>MUSC 226</td>
<td>History of Rock</td>
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<tr>
<td>MUSC 228</td>
<td>History of Electronic Music</td>
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<tr>
<td>MUSC 301</td>
<td>Performance in World Cultures</td>
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<tr>
<td>MUSC 324/</td>
<td>Music in World Cultures</td>
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<td>ANTH 324</td>
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<tr>
<td>MUSC 327</td>
<td>Popular Musics in the African Diaspora</td>
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<tr>
<td>MUSC 328/</td>
<td>Japanese Traditional Performing Arts</td>
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<tr>
<td>THAR 328</td>
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<tr>
<td>MUSC 386/</td>
<td>Evolution of the American Musical</td>
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<td>THAR 386</td>
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<tr>
<td>PERF 301</td>
<td>Performance in World Cultures</td>
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<tr>
<td>PERF 327</td>
<td>Popular Musics in the African Diaspora</td>
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<tr>
<td>PHIL 330</td>
<td>Philosophy of Art</td>
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<td>PHIL 375</td>
<td>Philosophy of the Visual Media</td>
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<tr>
<td>THAR 101</td>
<td>Introduction to Western Theatre and Drama</td>
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<tr>
<td>THAR 201</td>
<td>Introduction to World Theatre</td>
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<tr>
<td>THAR 301</td>
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<tr>
<td>MUSC 386</td>
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</tbody>
</table>
Courses in this category focus on the appreciation and analysis of creative artifacts and works of the human imagination. Courses involve the synthesis and interpretation of artistic expression and enable critical, creative, and innovative communication about works of art. The following skills will be addressed in the courses that comprise this area: critical thinking, communication, team work, and social responsibility.

**American History – 6 SCH**

- AFST 300/ HIST 300  Blacks in the United States, 1607-1877
- AFST 301/ HIST 301  Blacks in the United States Since 1877
- HIST 105  History of the United States
- HIST 106  History of the United States
- HIST 226  History of Texas
- HIST 230  American Military History, 1609 to Present
- HIST 232  History of American Sea Power
- HIST 258  American Indian History
- HIST 300/ AFST 300  Blacks in the United States, 1607-1877
- HIST 301/ AFST 301  Blacks in the United States Since 1877
- HIST 304  Mexican-American Frontier to 1848

Courses in this category focus on the consideration of past events and ideas relative to the United States, with the option of including Texas History for a portion of this component area. Courses involve the interaction among individuals, communities, states, the nation, and the world, considering how these interactions have contributed to the development of the United States and its global role. The following skills will be addressed in the courses that comprise this area: critical thinking, communication, social responsibility, and personal responsibility.

**Government/Political Science – 6 SCH**

- POLS 206  American National Government
- POLS 207  State and Local Government

Courses in this category focus on consideration of the Constitution of the United States and the constitutions of the states, with special emphasis on that of Texas. Courses involve the analysis of governmental institutions, political behavior, civic engagement, and their political and philosophical foundations. The following skills will be addressed in the courses that comprise this area: critical thinking, communication, social responsibility, and personal responsibility.

**Social and Behavioral Sciences – 3 SCH**

- AGEC 105  Introduction to Agricultural Economics
- AGEC 350  Environmental and Natural Resource Economics
- ALEC 450  Global Social Justice Issues in Agriculture
- ANTH 201  Introduction to Anthropology
- ANTH 202  Introduction to Archaeology
- ARCH 212  Social and Behavioral Factors in Design
- ARCH 458  Cultural and Ethical Considerations for Global Practice
- COMM 315  Interpersonal Communication
- COMM 320  Organizational Communication
- COMM 325  Persuasion
- COMM 335  Intercultural Communication
- COMM 365/ JOUR 365  International Communication
- ECON 202  Principles of Economics
- ECON 203  Principles of Economics
- EPSY 320  Child Development
- EPSY 321  Adolescent Development
- GEOG 201  Introduction to Human Geography
- HLTH 236  Race, Ethnicity and Health
- HORT 335  Sociohorticulture
- INST 210  Understanding Special Populations
- INST 222  Foundations of Education in a Multicultural Society
- INST 301  Educational Psychology
- JOUR 102  American Mass Media
- JOUR 365/ COMM 365  International Communication
- PSYC 107  Introduction to Psychology
- SOCI 205  Introduction to Sociology
- SOCI 206  Global Social Trends
- SOCI 207/ WGST 207  Introduction to Gender and Society
- SOCI 211  Sociology of Deviance
- SOCI 212  Sociology of Popular Culture
- SOCI 217  Introduction to Race and Ethnicity
- SOCI 304  Criminology
- SOCI 312  Population and Society
- SOCI 313  Military, War and Society
- SOCI 314  Social Problems
- SOCI 315/ WGST 315  The Marriage Institution
- SOCI 319/ SPMT 319  Sociology of Sport
- SOCI 327  Morality and Society
- SPMT 304  Sport Psychology Management and Practice
- SPMT 319/ SOCI 319  Sociology of Sport
- SPMT 336  Diversity in Sport Organizations
- SPMT 337  International Sport Business
- URPN 201  The Evolving City
- URPN 202  Building Better Cities
- URPN 361  Urban Issues
- WGST 207/ SOCI 207  Introduction to Gender and Society

Courses in this category focus on the application of empirical and scientific methods that contribute to the understanding of what makes us human. Courses involve the exploration of behavior and interactions among individuals, groups, institutions, and events, examining their impact on the individual, society, and culture. The following skills will be addressed in the courses that comprise this area: critical thinking, communication, empirical and quantitative, and social responsibility.


Applicable courses are listed in the Texas Higher Education Coordinating Board course inventory as meeting either the Mathematics or the Component Area Option Foundational Component Area.

1

Applicable courses are listed in the Texas Higher Education Coordinating Board course inventory as meeting either the Life and Physical Sciences or the Component Area Option Foundational Component Area.

2

Student Learning Outcomes

Student learning outcomes articulate the knowledge and skills we expect students to gain during their educational experiences. These learning outcomes ask students to connect their course- and degree-level learning to overall goals determined to be critically important to a university’s graduates as they make their way in the world after graduation and prepared to engage in learning for a lifetime.

First and foremost, of course, we expect students to have learned the material presented in their individual courses. From entry-level general education courses required of all undergraduates to capstone courses restricted to seniors in a major to specialized graduate seminars, by the time of graduation students are expected to have learned the material assigned in all of their courses. We call this “content knowledge.”

The broader institutional student learning outcomes ask students to connect the pieces of their education into a whole that synthesizes what they have learned. Students graduate not only knowing facts and understanding basic concepts but also demonstrating an ability to apply and explain those facts and concepts creatively in new situations. Students gain the skills and knowledge that allows them to thrive in a complex world.

Baccalaureate

A student who graduates from Texas A&M University with a baccalaureate degree will have acquired the knowledge and skills necessary to:

Master the depth of knowledge required for a degree, including the ability to:

- Articulate disciplinary and interdisciplinary theories, concepts, principles, skills, and practices;
- Synthesize knowledge across courses and other experiences; and
- Apply knowledge from core curriculum courses, discipline-based courses, and other experiences in a range of contexts to solve problems and make decisions.

Demonstrate critical thinking, including the ability to:

- Evaluate, analyze, and integrate information from a variety of sources;
- Use appropriate strategies and tools to represent, analyze, and integrate information; and
- Develop critical, reasoned positions.

Communicate effectively, including the ability to:

- Demonstrate effective oral communication skills (which could include the use of languages such as American Sign language for those who do not communicate orally);
- Demonstrate effective writing skills;
- Demonstrate effective nonverbal communication skills (which could include appropriate use of performance, design, or representations such as maps, tables, and graphs);
- Listen actively and critically;
- Present work effectively to a range of audiences; and
- Effectively communicate original and creative ideas.

Practice personal and social responsibility, including the ability to:

- Practice ethical leadership;
- Recognize an ethical dilemma and apply rational decision-making in order to address it;
- Choose ethical courses of action in research and practice;
- Acknowledge and address the consequences of one’s own actions; and
- Engage in local and global civic activities.

Demonstrate social, cultural, and global competence, including the ability to:

- Live and work effectively in a diverse and global society;
- Articulate the value of a diverse and global perspective; and
- Recognize diverse economic, political, cultural, and religious opinions and practices.

Prepare to engage in lifelong learning, including the ability to:

- Exhibit the skills necessary to acquire, organize, reorganize, and interpret new knowledge;
- Show proficiency in current technologies and the ability to adapt to emerging technologies;
- Recognize and participate in activities that enhance wellness of body, mind, and spirit;
- Formulate a plan of personal goals for continued professional growth; and
- Demonstrate intellectual curiosity.

Work collaboratively, including the ability to:

- Participate effectively in teams;
- Consider different points of view; and
- Work with others to support a shared purpose or goal.

Degree Information

Which Catalog to Follow

In meeting the requirements for a baccalaureate degree, a student is expected to complete the course and hour requirements as outlined in the catalog in effect at the time he or she first enrolls at Texas A&M. Normally, a student will not be granted a degree based upon completion of the requirements set forth in a catalog more than seven years old. Before changing catalogs, the student must consult his or her academic advisor. A student changes catalogs by filing a written notification with his or her dean. It is incumbent on the student to verify that the change has been made. Texas A&M University Student Rules (including periodic revisions) is the governing document in case of conflict between this catalog and Texas A&M University Student Rules. It is the responsibility of the individual student to read this information carefully and to use it as a reference. Please refer to the Student Rules for this information.
Whereas each college must retain the flexibility to improve its curriculum, course offerings may be changed during the student’s education. If a course required under a previous catalog is no longer offered, a student eligible to graduate according to that catalog should consult his or her academic advisor or dean to identify another course that may be used to fulfill the requirement. Course adjustments in the degree program are permitted only with the approval of the dean through the department head or program director. Furthermore, the University reserves the right to make any changes in requirements it may consider necessary and desirable by due notice in the catalog.

Students are required to take the courses listed in a curriculum; however, the display of a curriculum does not in any way indicate the length of time required to finish degree requirements. Rather, this display is intended as a guide to indicate the preferred order for completion of degree requirements. Exceptions to certain requirements may be petitioned through the department head to the dean of the college.

**Degrees Offered**

The following degrees are offered for the satisfactory completion of resident study in the appropriate curriculum:

- Bachelor of Arts (BA)
- Bachelor of Business Administration (BBA)
- Bachelor of Environmental Design (BED)
- Bachelor of Landscape Architecture (BLA)
- Bachelor of Science (BS)
- Bachelor of Science in Nursing (BSN)
- Master of Agribusiness (MAB)
- Master of Agriculture (MAgr)
- Master of Architecture (MArch)
- Master of Arts (MA)
- Master of Biotechnology (MBiot)
- Master of Business Administration (MBA)
- Master of Computer Science (MCS)
- Master of Education (MED)
- Master of Engineering (MENG)
- Master of Equine Industry Management (MEIM)
- Master of Financial Management (MFM)
- Master of Fine Arts (MFA)
- Master of Geoscience (MGSc)
- Master of Health Administration (MHA)
- Master of Industrial Distribution (MID)
- Master of International Affairs (MIA)
- Master of Land and Property Development (MLPD)
- Master of Landscape Architecture (MLA)
- Master of Natural Resources Development (MNRD)
- Master of Public Health (MPH)
- Master of Public Service and Administration (MPSA)
- Master of Real Estate (MRE)
- Master of Recreation and Resources Development (MRRD)
- Master of Science (MS)
- Master of Science in Nursing (MSN)
- Master of Science in Public Health (MSPH)
- Master of Urban Planning (MUP)
- Master of Water Management and Hydrological Science (MWM)
- Master of Wildlife Science (MWSC)
- Doctor of Dental Surgery (DDS)
- Doctor of Education (EdD)
- Doctor of Engineering (DEng)
- Doctor of Medicine (MD)
- Doctor of Pharmacy (PharmD)
- Doctor of Philosophy (PhD)
- Doctor of Public Health (DrPH)
- Doctor of Veterinary Medicine (DVM)
- Juris Master (JM)
- Juris Doctor (JD)

The buying, selling, creating, duplicating, altering, giving or obtaining the Texas A&M diploma or other academic record is prohibited by state law. A person who violates this statute or who aids another person in violation is guilty of a misdemeanor and is subject to a fine and/or confinement if convicted.

The University has the right to rescind a previously granted degree if the University becomes aware of information indicating that the degree never should have been granted.

**Requirements for a Baccalaureate Degree**

To be a candidate for a degree at the end of the semester, a student must:

1. Be registered for or have completed all degree requirements by the 60th class day of the fall or spring semester, or the 15th class day of the second summer term either in residence or at another college or university. Proof of enrollment in any courses taken at another college or university must be provided to the Office of the Registrar, Degree Audit, by the above deadlines. A student must be enrolled in his or her degree-granting college(s) at the beginning of the student’s last semester at Texas A&M to be a candidate for a degree from that college.

2. Complete a minimum of 120 credit hours.

3. Complete, with at least a 2.0 grade point average, all undergraduate coursework attempted at Texas A&M University.

4. Complete, with a 2.0 grade point average, all courses included in the major field of study.

5. Meet the Residence Requirement. A minimum of 36 semester hours of 300- and/or 400-level coursework must be successfully completed in residence at Texas A&M to obtain a baccalaureate degree. A minimum of 12 of these 36 semester hours must be in the major. A student participating in Texas A&M University off-campus study programs approved by the student’s college may apply upper division credits earned in the programs toward the residence requirement up to a maximum of 18 semester hours, including hours transferred from another institution as part of one of these programs. These Texas A&M University off-campus study programs may involve domestic or international institutions and may be taught by Texas A&M University faculty or faculty from other institutions. Students choosing to participate in such programs and wishing to apply credits earned from the programs toward the residence requirement must receive college approval prior to the student’s participation in the off-campus study program. Students participating in international programs must contact the Study Abroad Programs Office for details on how to obtain approval for courses taken outside the United States. Students...
participating in domestic off-campus programs must contact the dean's office of their college for approval procedures.

6. Complete the University Core Curriculum. Core Curriculum courses are listed on the University Core Curriculum (p. 19) page. For additional information, please reference http://core.tamu.edu.

7. Complete the citizenship requirement, which includes at least 6 credit hours in government/political science and at least 6 credit hours in American history. American National Government (POLS 206) and State and Local Government (POLS 207) fulfill the government/political science requirement.

Both the government/political science and American history requirements may be met, in whole or in part, by equivalent coursework satisfactorily completed at another accredited college or university.

State law permits the substitution of 3 hours of history and 3 hours of government/political science for a student in the program of an approved senior ROTC unit. With the approval of the dean of the appropriate college, students successfully completing the required 12 hours of upper-level ROTC courses will be deemed to have completed the equivalent of POLS 206 or POLS 207 plus HIST 105 or HIST 106 (or another appropriate course) for a total of 6 hours.

Students pursuing teacher certification are not allowed to substitute ROTC credits for this requirement.

8. Complete the Foreign Language requirement. A minimum of one year of foreign language is required in many degree programs at Texas A&M. This degree requirement can be satisfied by the satisfactory completion in high school of two units of the same foreign language or one year of the same language at the college level.

a. International students are not permitted to enroll in courses to satisfy this degree requirement.

b. Bachelor of Arts degrees from the College of Liberal Arts require an additional 6 semester hours at the 200-level.

c. Students who wish to demonstrate foreign language proficiency without taking acceptable high school or college courses may do so through the existing credit by examination process. In cases where students wish to demonstrate proficiency in a language not taught at Texas A&M, the following procedures shall apply. The student shall request an examination from the Head of the Department of Hispanic Studies or the Head of the Department of International Studies. This department will coordinate the administration of special examinations to demonstrate foreign language proficiency. This will include finding an appropriate examination to test the student's proficiency, informing the student how to arrange to take the examination and certifying the results to the student's advisor. All arrangements shall be made and fees paid by the student.

d. American Sign Language (ASL) may be used to fulfill the foreign language degree requirement unless otherwise specified by the student's college or department. Students may either transfer ASL credits or arrange to be tested at another institution. (Texas A&M does not offer courses in ASL.)

9. Complete the Writing requirement. The requirement may be met by passing two writing (W) courses or one writing (W) course and one oral communication (C) course. The requirement may not be met by any course listed as a University Core Curriculum communication requirement, nor may it be met through credit by examination. It may be met by a course transferred from another institution of higher learning, with the approval of the dean of the student's college and the Associate Provost for Undergraduate Studies. Upon request, students will provide their dean with a course description, syllabus or writing sample from the course being transferred.

10. Complete the International and Cultural Diversity requirement (6 credit hours). As individual and national destinies become progressively more interconnected, the ability to survive and succeed is increasingly linked to the development of a more pluralistic, diverse and globally-aware populace. Two courses from the list available on the International and Cultural Diversity Requirements (p. 34) page are to be taken by the student. For additional information, please reference http://icd.tamu.edu. If a course listed also satisfies a Core Curriculum requirement, it can be used to satisfy both requirements if the student wishes to do so.

11. Be formally recommended for graduation by the Faculty Senate after consideration of his or her complete record.


Undergraduate Minor Programs

A minor is a selection of courses that focus on a single area or an interdisciplinary perspective as developed by the department or program that offers the minor. The department or program offering the minor is responsible for setting enrollment limits and deciding which courses are used to meet the minor. Coursework consists of 15-18 hours with a minimum of 6 in residence at the 300-400 level.

If a minor is offered by a department or academic unit, then the minor is considered to be available to all students as resources permit. Students must declare a minor no later than the date on which they apply for graduation. A maximum of two minors per degree can be completed by students. A minor is displayed on the transcript after graduation but not displayed on the diploma.

Two Degrees

A student pursuing a second baccalaureate degree must have completed all the essential work of the second curriculum not covered in the first. In all such cases, the total semester hours required must be at least 30 hours additional to the greater number required for either degree. The student must have a minimum of 36 hours of 300- and 400-level courses, 12 hours of which must be in the major field of study, in residence at Texas A&M. The student must also meet the citizenship requirements for American history and government/political science.

Baccalaureate Degree Option for Students Granted Early Admission to Medical/Professional Programs

A minimum of 120 hours is required for a Texas A&M University undergraduate degree. Some degree programs require additional hours (see specific degree requirements for each major in this catalog). Students from undergraduate programs who are selected early into participating programs in medicine, dentistry, optometry or veterinary medicine must have satisfied all University Core Curriculum requirements as specified in this catalog. A student intending to use this baccalaureate degree option must coordinate early in his or her program with the appropriate undergraduate advisor in order to ensure that degree requirements are met. The degree candidate must complete at least half of the total hours required for the baccalaureate degree while in residence at Texas A&M University. This requirement includes a minimum of 24 hours of upper division courses in residence, of which a minimum of 12 must be in the major. A student will become eligible for the Texas A&M degree upon
completion of the total credit hours required by his or her undergraduate degree plan. Each undergraduate major specifies those professional courses that may be used to satisfy its degree plan.

A student then selected into an approved professional program will be required to successfully complete a minimum of one full year of acceptable work at an accredited school of medicine, dentistry, optometry, law, or veterinary medicine in the United States. The student will be responsible for submitting official transcripts to the Office of Admissions to verify completion of agreement requirements. The participating undergraduate department or program will complete the required degree audit, approve the necessary substitutions and clear the student to graduate.

Baccalaureate degrees will be awarded in May, August and December after the completion of the first year of the approved professional program or the necessary hours for the desired baccalaureate degree. Students must apply for graduation at Howdy. Check the academic calendar for deadlines and for commencement dates. Questions may be emailed to degree-audit@tamu.edu or call (979) 845-1089. For additional information about graduation, visit the graduation (http://graduation.tamu.edu) website.

Students who have received a baccalaureate degree are not eligible to participate in commencement. Individuals who would have been eligible to participate in this program had it been in effect when they were students at Texas A&M University may request the conferral of a baccalaureate degree. Although this is a University-wide policy, not all colleges choose to participate. The use of this baccalaureate option will remain a college initiative in that each individual college and/or program must clear each candidate for graduation.

**Graduation with Honors**

**Undergraduate Students**

To be eligible for graduation with Latin honors, a student seeking a baccalaureate degree must enroll in and complete a minimum of 60 semester hours at Texas A&M University, Texas A&M University at Galveston, or Texas A&M University at Qatar preceding graduation and have an institutional grade point average equal to or greater than that required for the appropriate category of honors. Course credit received by examination, and courses reserved for graduate credit only, are excluded from the calculation of the number of hours and the grade point average for graduation with Latin honors.

**Categories for Latin honors shall be designated as follows:**

- **Summa Cum Laude:** A student may be graduated Summa Cum Laude with a grade point average of 3.90 or above.
- **Magna Cum Laude:** A student may be graduated Magna Cum Laude with a grade point average range of 3.70 through 3.899.
- **Cum Laude:** A student may be graduated Cum Laude with a grade point average range of 3.50 through 3.699.

Grade point averages used to determine Latin honors designations are calculated during the final degree audit the day before the ceremonies and include hours and final grades in courses taken during the graduation semester. Latin honors designations will not be changed after the final graduation clearance deadline.

Information regarding other honors designations may be found on the Honors and Undergraduate Research (p. 92) page.

Please note:

- Students are not required to enroll in honors courses to graduate with Latin honors.
- Taking designated honors courses does not mean students will graduate with Latin honors.

No Upper Division student found guilty of academic misconduct may receive Cum Laude, Magna Cum Laude, or Summa Cum Laude honors at graduation. Upper Division status is defined as having earned 60 or more credit hours, including transfer hours, prior to the date of the violation. This sanction is automatic upon a finding of academic misconduct, and is imposed without regard to the severity of other sanctions imposed by the instructor or Honor Council.

For more information, please see the Aggie Honor System Office (p. 71) section in the catalog.

**First-Professional Students**

- Students who complete their entire course of study at the Texas A&M Health Science Center College of Medicine are eligible for academic honors. In the College of Medicine, students must obtain a grade point average of 3.50 or greater to graduate with honors.
- Students who complete their entire course of study at the Texas A&M College of Veterinary Medicine may qualify to graduate Summa Cum Laude by holding a final grade point average of 3.90 or above, Magna Cum Laude with a grade point average of 3.70 through 3.899 and Cum Laude with a grade point average of 3.50 through 3.699.

**Graduation Application, Diploma and Commencement**

Formal application for degrees must be submitted online in Howdy by the deadline stated in the academic calendar.

The diploma of the University, with the appropriate degree, will be granted to the student who has made formal application for the degree by the published official deadline, has all grades on record in the Office of the Registrar, including grades pertaining to graduation with honors, and has satisfied all degree requirements by no later than 5 p.m., Friday, the first week of classes of the succeeding semester or summer term following commencement.

Students must have settled all financial obligations to the university prior to receiving a diploma.

Graduate and undergraduate students who plan to attend a commencement ceremony must do so the semester they apply for graduation and complete their degree requirements.
Tuition Charged for Excess Credit Hours

The State of Texas will not provide funds to state institutions of higher education for excess semester credit hours earned by a resident student. Because funding will not be provided by the State, and as permitted by State law, Texas A&M University will charge tuition at the non-resident rate to all students who exceed the semester credit hour limit for their program. Excess semester credit hours are those which accrue after the student attempts more than 30 hours beyond the number of semester credit hours required for the completion of the degree program in which the student is enrolled. Thus, the student may accumulate up to 30 hours beyond those required for the chosen degree program and not exceed the limitation. The limitation on excess credit hours applies only to those undergraduate students who first enter higher education in the fall 1999 and thereafter. The semester credit hours counted toward the limitation include all hours attempted by the student except:

- Semester credit hours earned by the student before receiving a baccalaureate degree that has been previously awarded.
- Semester credit hours earned by the student by examination or other procedure by which credit is earned without registering for a course for which tuition is charged.
- Credit for remedial education courses, technical courses, workforce education courses funded according to contact hours, or other courses that would not generate academic credit that could be applied toward a degree program at Texas A&M University.
- Semester credit hours earned by the student at a private or an out-of-state institution.
- Semester credit hours earned by the student before graduating from high school and used to satisfy high school graduation requirements (Effective June 2009).

Supplementary Fee for Courses Attempted More than Twice

Certain courses that are attempted by a student more than twice at a public institution of higher education in Texas may not be reported for state funding. As a result, the institution must either pass the non-funded portion to all students, or charge a supplementary fee to the student who is repeating the course. Texas A&M has chosen to assess a supplementary fee to those students attempting a supplementary fee to those students attempting a course more than twice.

A student attempting certain courses more than twice at Texas A&M University will be subject to a supplementary fee of $125 per semester credit hour ($375 for a 3 hour course) for the repeated course, in addition to tuition and required fees associated with the course. The general criteria for determining which courses are subject to the supplementary fee are:

- Courses a student has completed twice at Texas A&M University with a grade of A, B, C, D, F, F* (academic dishonesty), S (satisfactory), U (unsatisfactory), I (incomplete), Q (authorized drop after the add/drop period) or X (no grade submitted) are subject to the fee.
- Courses identified by the University as repeatable for credit are not subject to the fee. The "3peat Exclusion" attribute is displayed under course attributes in the Schedule of Classes for each course identified as repeatable for credit.
- Courses dropped with no record (NR), no grade (NG) and withdrawals (W) are not subject to the fee.

Students will be notified at the time they register for a course that it has been taken twice at Texas A&M University and is subject to the supplementary fee.

Undergraduate Certificate Programs

For a list of approved undergraduate certificate programs, please visit the Office of the Registrar (http://curricularservices.tamu.edu/Our-Services/Curricular-Services/Curricular-Approvals/Program-Approvals/Approved-Certificate-Programs) website.

Degree Programs Tables

Undergraduate, Graduate and Professional Degree Programs

Approved by the Texas Higher Education Coordinating Board

Interdisciplinary Degree Programs

<table>
<thead>
<tr>
<th>Degree Program</th>
<th>Baccalaureate</th>
<th>Masters</th>
<th>Doctorate</th>
<th>Professional</th>
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<tbody>
<tr>
<td>Agribusiness</td>
<td>BS</td>
<td>MAB</td>
<td>PhD</td>
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<tr>
<td>Agribusiness and Managerial Economics</td>
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<tr>
<td>Biotechnology</td>
<td>MBIOT</td>
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<td>PhD</td>
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<td>Ecology and Evolutionary Biology</td>
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<tr>
<td>Environmental Studies</td>
<td>BS</td>
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<tr>
<td>Genetics 2</td>
<td>MS</td>
<td>PhD</td>
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<tr>
<td>Marine Biology 3</td>
<td>MS</td>
<td>PhD</td>
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<tr>
<td>Molecular and Environmental Plant Sciences</td>
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<tr>
<td>Neuroscience</td>
<td>MS</td>
<td>PhD</td>
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<tr>
<td>Spatial Sciences</td>
<td>BS</td>
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<td>PhD</td>
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<tr>
<td>Toxicology</td>
<td>MS</td>
<td>PhD</td>
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<tr>
<td>University Studies BA, BS</td>
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<tr>
<td>Water Management and Hydrological Science</td>
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1 Jointly administered by the Dwight Look College of Engineering and the Mays Business School.
2 Administered by the Colleges of Agriculture and Life Sciences, Medicine, Science and Veterinary Medicine and Biomedical Sciences.
3 Joint program with Texas A&M University, Texas A&M University at Galveston and Texas A&M University–Corpus Christi.

College of Agriculture and Life Sciences

<table>
<thead>
<tr>
<th>Degree Program</th>
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<th>Masters</th>
<th>Doctorate</th>
<th>Professional</th>
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<tr>
<td>Renewable Natural Resources</td>
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Department of Agricultural Economics

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<thead>
<tr>
<th>Agricultural Economics</th>
<th>BS</th>
<th>MS, MAg</th>
<th>PhD</th>
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For more information, please visit the Interdisciplinary Degree Programs website.
<table>
<thead>
<tr>
<th>Department of Agricultural Leadership, Education and Communications</th>
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</thead>
</table>
| Agricultural BS.
Communications and Journalism |
| Agricultural MAgr |
| Development |
| Agricultural Education EdD |
| Agricultural BS. |
| Leadership and Development |
| Agricultural MS, MEd, PhD |
| Leadership, Education, and Communication |
| Agricultural BS. |
| Science |
| Department of Animal Science |
| Animal MS, PhD |
| Breeding |
| Animal MS, MAgr, PhD |
| Science |
| Equine MEIM |
| Industry Management |
| Physiology of Reproduction MS, PhD |
| Department of Biochemistry and Biophysics |
| Biochemistry BS, MS, PhD |
| Genetics BS |
| Department of Biological and Agricultural Engineering |
| Agricultural MS, MAgr BS. |
| Systems Management |
| Biological and Agricultural MS, MEng, PhD |
| Engineering |
| Department of Ecosystem Science and Management |
| Ecological BS. |
| Restoration |
| Ecosystem MS, MAgr, PhD |
| Science and Management |
| Forestry BS |
| Natural MNRD |
| Resources Development |
| Rangeland BS. |
| Ecology and Management |
| Spatial BS. |
| Sciences |
| Department of Entomology |
| Entomology BS. |
| Forensic and Investigative BS. |
| Sciences |
| Department of Horticultural Sciences |
| Horticulture BS, MS, MAgr, PhD |
| Plant Breeding BS, MS, PhD |
| Department of Nutrition and Food Science |
| Food BS, MS, MAgr, PhD |
| Science and Technology |
| Nutrition BS, MS, PhD |
| Department of Plant Pathology and Microbiology |
| Bioenvironment BS. |
| Sciences |
| Plant Pathology BS, MS, PhD |
| Department of Poultry Science |
| Poultry BS, MS, MAgr, PhD |
| Science |
| Department of Recreation, Park and Tourism Sciences |
| Community Development BS. |
| Natural Resources Development BS, MS, PhD |
| Recreation, Park and Tourism BS, MS, PhD |
| Sciences |
| Recreation and Resources Development MRRD |
| Department of Soil and Crop Sciences |
| Agronomy MS, PhD |
| Plant Breeding BS, MS, PhD |
| Plant and Environmental BS. |
| Soil Science |
| Soil Science BS, MS, PhD |
| Turfgrass Science BS. |
| Department of Wildlife and Fisheries Sciences |
| Natural MNRD |
| Resources Development |
| Wildlife and Fisheries BS, MS, PhD |
| Sciences |
| Wildlife Science MWSC |

1 Also offered as joint program with Texas Tech University when offered by Distance Education.
2 Joint Program with College of Education and Human Development. Degrees conferred in College of Agriculture and Life Sciences.

3 Also offered as cooperative program with Texas A&M University–Kingsville.

### College of Architecture

<table>
<thead>
<tr>
<th>Degree Program</th>
<th>Baccalaureate</th>
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<th>Doctorate</th>
<th>Professional</th>
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<td>Construction Management</td>
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<td>Department of Landscape Architecture and Urban Planning</td>
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<td>Land and Property Development</td>
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### Mays Business School

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### College of Education and Human Development

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#### Department of Health and Kinesiology

| Athletic Training | MS |
| Community Health | BS |
| Health | BS |
| Health Education | MS | PhD |
| Kinesiology | BS | MS | PhD |
| Sport Management | BS | MS | |

#### Department of Teaching, Learning and Culture

| Curriculum and Instruction | MS, MEd<sup>2</sup> | PhD, EdD<sup>1</sup> |
| Interdisciplinary Studies | BS |

<sup>1</sup> Also offered as a Cooperative Doctoral Program with Texas A&M International University.

<sup>2</sup> Also offered as a dual degree program with Qatar University.

### Dwight Look College of Engineering

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#### Department of Aerospace Engineering

| Aerospace Engineering | BS | MS, MEng | PhD |

#### Department of Biomedical Engineering

| Biomedical Engineering | BS | MS, MEng | PhD |

#### Artie McFerrin Department of Chemical Engineering

| Chemical Engineering | BS | MS, MEng | PhD |

#### Zachary Department of Civil Engineering

| Civil Engineering | BS | MS, MEng | PhD |

| Ocean Engineering | BS | MS, MEng | PhD |
## College of Geosciences

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## Department of Geography

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## The Bush School of Government and Public Service

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## Department of Public Service and Administration

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## College of Liberal Arts

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## College of Medicine

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Medical Sciences  
Medicine  
Department of Anesthesiology  
Department of Clinical Translational Medicine  
Department of Emergency Medicine  
Department of Family and Community Medicine  
Department of Humanities in Medicine  
Department of Internal Medicine  
Department of Medical Physiology  
Department of Microbial Pathogenesis and Immunology  
Department of Molecular and Cellular Medicine  
Department of Neurosciences and Experimental Therapeutics  
Department of Obstetrics and Gynecology  
Department of Pathology  
Department of Pediatrics  
Department of Psychiatry and Behavioral Science  
Department of Radiology  
Department of Surgery  

College of Nursing  
Degree Program  Baccalaureate  Masters  Doctorate  Professional  
Family Nurse  MSN  
Practitioner  Nursing  BSN  
Nursing Education  MSN  

Irma Lerma Rangel College of Pharmacy  
Degree Program  Baccalaureate  Masters  Doctorate  Professional  
Pharmacy  PharmD  
Department of Pharmaceutical Sciences  
Department of Pharmacy  

School of Public Health  
Degree Program  Baccalaureate  Masters  Doctorate  Professional  
Biostatistics  MSPH  
Epidemiology  MSPH  
Epidemiology and Environmental Health  DrPH  
Environmental Health  MSPH  
Health Services Research  MPH  
Occupational Safety and Health  MPH  
Department of Epidemiology and Biostatistics  Biostatistics  MPH  
Epidemiology  MPH  
Department of Environmental and Occupational Health  Environmental Health  MPH  
Department of Health Policy and Management  Health Policy and Management  MPH  
Department of Health Promotion and Community Health Sciences  Health Promotion and Community Health  MPH, MSPH  DrPH  
Department of Public Health Studies  Public Health  BS  

College of Science  
Degree Program  Baccalaureate  Masters  Doctorate  Professional  
Department of Biology  Biology  BA, BS  MS  PhD  
Microbiology  BS  MS  PhD  
Molecular and Cell Biology  Zoology  BS  
Department of Chemistry  Chemistry  BA, BS  MS  PhD  
Department of Mathematics  Applied Mathematical Sciences  BS
### General Information

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#### Marine Sciences

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#### Department of Maritime Transportation

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1 Joint program between Texas A&M University, Texas A&M University at Galveston and Texas A&M University – Corpus Christi.

### Texas A&M University at Qatar

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#### Department of Marine Engineering Technology

#### International and Cultural Diversity Requirements

Students are required to complete six (6) semester credit hours from the courses listed.

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<tr>
<td>AFST 204/ENGL 204</td>
<td>Introduction to African-American Literature</td>
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</tr>
<tr>
<td>POLS 322</td>
<td>Western European Government and Politics</td>
<td>3</td>
</tr>
<tr>
<td>POLS 323</td>
<td>Political Systems of Latin America</td>
<td>3</td>
</tr>
<tr>
<td>POLS 324</td>
<td>Politics of Global Inequality</td>
<td>3</td>
</tr>
<tr>
<td>POLS 326</td>
<td>Government and Politics of Eastern Europe</td>
<td>3</td>
</tr>
<tr>
<td>POLS 328</td>
<td>Globalization and Democracy</td>
<td>3</td>
</tr>
<tr>
<td>POLS 338</td>
<td>Government and Politics of the Former Soviet Union</td>
<td>3</td>
</tr>
<tr>
<td>POLS 365/</td>
<td>Asian Governments and Politics</td>
<td>3</td>
</tr>
<tr>
<td>ASIA 365</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POLS 367/</td>
<td>Women in Government in Comparative Perspective</td>
<td>3</td>
</tr>
<tr>
<td>WGST 367</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POLS 424</td>
<td>Comparative Governmental Institutions</td>
<td>3</td>
</tr>
<tr>
<td>POLS 432</td>
<td>The Politics of European Union</td>
<td>3</td>
</tr>
<tr>
<td>POLS 462/</td>
<td>Women and the Law</td>
<td>3</td>
</tr>
<tr>
<td>WGST 462</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PSYC 300/</td>
<td>Psychology of Women</td>
<td>3</td>
</tr>
<tr>
<td>WGST 300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RELS 303/</td>
<td>Near Eastern Religions</td>
<td>3</td>
</tr>
<tr>
<td>HUMA 303</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RELS 304/</td>
<td>Indian and Oriental Religions</td>
<td>3</td>
</tr>
<tr>
<td>HUMA 304</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RELS 312</td>
<td>Contemplative Practices in the Modern World</td>
<td>3</td>
</tr>
<tr>
<td>RELS 321</td>
<td>Political Islam and Jihad</td>
<td>3</td>
</tr>
<tr>
<td>RELS 403/</td>
<td>Anthropology of Religion</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 403</td>
<td></td>
<td></td>
</tr>
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<td>RPTS 340</td>
<td>Recreation, Parks, Tourism and Diverse Populations</td>
<td>3</td>
</tr>
<tr>
<td>RUSS 201</td>
<td>Intermediate Russian I</td>
<td>3</td>
</tr>
<tr>
<td>RUSS 202</td>
<td>Intermediate Russian II</td>
<td>3</td>
</tr>
<tr>
<td>RUSS 443/</td>
<td>Contemporary Russian Prose</td>
<td>3</td>
</tr>
<tr>
<td>EURO 443</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUSS 444/</td>
<td>Russian Drama</td>
<td>3</td>
</tr>
<tr>
<td>EURO 444</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUSS 447/</td>
<td>Russian Artistic Culture II: 1890 to Present</td>
<td>3</td>
</tr>
<tr>
<td>EURO 447</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCSC 420</td>
<td>Brazilian Agriculture and Food Production Systems</td>
<td>3-6</td>
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<tr>
<td>SOCI 205</td>
<td>Introduction to Sociology</td>
<td>3</td>
</tr>
<tr>
<td>SOCI 206</td>
<td>Global Social Trends</td>
<td>3</td>
</tr>
<tr>
<td>SOCI 207/</td>
<td>Introduction to Gender and Society</td>
<td>3</td>
</tr>
<tr>
<td>WGST 207</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOCI 212</td>
<td>Sociology of Popular Culture</td>
<td>3</td>
</tr>
<tr>
<td>SOCI 217</td>
<td>Introduction to Race and Ethnicity</td>
<td>3</td>
</tr>
<tr>
<td>SOCI 310/</td>
<td>Motherhood in Society</td>
<td>3</td>
</tr>
<tr>
<td>WGST 310</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOCI 312</td>
<td>Population and Society</td>
<td>3</td>
</tr>
<tr>
<td>SOCI 313</td>
<td>Military, War and Society</td>
<td>3</td>
</tr>
<tr>
<td>SOCI 314</td>
<td>Social Problems</td>
<td>3</td>
</tr>
<tr>
<td>SOCI 315/</td>
<td>The Marriage Institution</td>
<td>3</td>
</tr>
<tr>
<td>WGST 315</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOCI 316/</td>
<td>Sociology of Gender</td>
<td>3</td>
</tr>
<tr>
<td>WGST 316</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOCI 317/</td>
<td>Racial and Ethnic Relations</td>
<td>3</td>
</tr>
<tr>
<td>AFST 317</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOCI 323/</td>
<td>Sociology of African Americans</td>
<td>3</td>
</tr>
<tr>
<td>AFST 323</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOCI 325/</td>
<td>International Business Behavior</td>
<td>3</td>
</tr>
<tr>
<td>ASIA 325</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOCI 327</td>
<td>Morality and Society</td>
<td>3</td>
</tr>
<tr>
<td>SOCI 329/</td>
<td>Pacific Rim Business Behavior</td>
<td>3</td>
</tr>
<tr>
<td>ASIA 329</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOCI 330</td>
<td>Sociology of Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>SOCI 403</td>
<td>Sociology of Latinos</td>
<td>3</td>
</tr>
<tr>
<td>SOCI 419</td>
<td>Social Class in Contemporary Society</td>
<td>3</td>
</tr>
<tr>
<td>SOCI 423</td>
<td>Globalization and Social Change</td>
<td>3</td>
</tr>
<tr>
<td>SOCI 424/</td>
<td>Women and Work in Society</td>
<td>3</td>
</tr>
<tr>
<td>WGST 424</td>
<td></td>
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<td>SPAN 201</td>
<td>Intermediate Spanish I</td>
<td>3</td>
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<td>3</td>
</tr>
<tr>
<td>SPAN 312</td>
<td>Hispanic Culture and Civilization: 18th Century to Present</td>
<td>3</td>
</tr>
<tr>
<td>SPAN 320</td>
<td>Introduction to Hispanic Literature</td>
<td>3</td>
</tr>
<tr>
<td>SPAN 410</td>
<td>Hispanic Film</td>
<td>3</td>
</tr>
<tr>
<td>SPAN 411</td>
<td>Contemporary Hispanic Society and Culture</td>
<td>3</td>
</tr>
<tr>
<td>SPAN 412</td>
<td>Hispanic Writers in the U.S.</td>
<td>3</td>
</tr>
<tr>
<td>SPAN 421</td>
<td>Spanish Language Poetry</td>
<td>3</td>
</tr>
<tr>
<td>SPAN 450</td>
<td>Contemporary Spanish and Spanish-American Literature</td>
<td>3</td>
</tr>
<tr>
<td>SPMT 220</td>
<td>Olympic Studies</td>
<td>3</td>
</tr>
<tr>
<td>SPMT 336</td>
<td>Diversity in Sport Organizations</td>
<td>3</td>
</tr>
<tr>
<td>SPMT 337</td>
<td>International Sport Business</td>
<td>3</td>
</tr>
<tr>
<td>TEFB 273</td>
<td>Introduction to Culture, Community, Society and Schools</td>
<td>3</td>
</tr>
<tr>
<td>THAR 101</td>
<td>Introduction to Western Theatre and Drama</td>
<td>3</td>
</tr>
<tr>
<td>THAR 156</td>
<td>Dress, Culture and Society</td>
<td>3</td>
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<td>THAR 201</td>
<td>Introduction to World Theatre</td>
<td>3</td>
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<tr>
<td>THAR 281</td>
<td>History of the Theatre II</td>
<td>3</td>
</tr>
<tr>
<td>THAR 301</td>
<td>Performance in World Cultures</td>
<td>3</td>
</tr>
<tr>
<td>THAR 328/</td>
<td>Japanese Traditional Performing Arts</td>
<td>3</td>
</tr>
<tr>
<td>MUSC 328</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THAR 386/</td>
<td>Evolution of the American Musical</td>
<td>3</td>
</tr>
<tr>
<td>MUSC 386</td>
<td></td>
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<tr>
<td>URPN 361</td>
<td>Urban Issues</td>
<td>3</td>
</tr>
<tr>
<td>VTPB 221</td>
<td>Great Diseases of the World</td>
<td>3</td>
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<tr>
<td>VTPP 401</td>
<td>History of Human and Veterinary Medicine in Europe</td>
<td>4</td>
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<tr>
<td>WGST 200</td>
<td>Introduction to Women's and Gender Studies</td>
<td>3</td>
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<td>WGST 207/</td>
<td>Introduction to Gender and Society</td>
<td>3</td>
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<td>SOCI 207</td>
<td></td>
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<tr>
<td>WGST 300/</td>
<td>Psychology of Women</td>
<td>3</td>
</tr>
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<td>PSYC 300</td>
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<td>WGST 307</td>
<td>Gender and Education</td>
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<tr>
<td>WGST 308</td>
<td>Gender and International Education</td>
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</tbody>
</table>
Application Information

Both Texas and non-Texas students can apply for undergraduate admission in the year 2016 to any Texas Public University for freshman, transfer and international admission by using the ApplyTexas Application. You may access the appropriate application from the ApplyTexas Application website (www.applytexas.org) or the Texas A&M University website (http://admissions.tamu.edu).

Texas A&M University has several conveniently located Prospective Student Centers throughout the state, staffed with regional advisors ready to serve you. Please contact the center nearest you to learn more about admissions, financial aid, academic programs and student services.

Admission

Application Information (p. 39)
Items Necessary to Complete an Application File (p. 42)
Notification of Application Status (p. 43)
Required Coursework (p. 44)
State of Texas Uniform Admission Policy (p. 44)
Additional Information for Freshman Applicants (p. 44)
Freshman Admissions (p. 44)
Information for all Freshman Applicants (p. 44)
Notice of Admission Decision (p. 44)
Suspected Fraudulent Admission Applications (p. 45)
Transfer Admissions (p. 45)
Notification of Admission Decisions (p. 50)
Transfer Course Credit Policies (p. 52)
International Admission Criteria (p. 54)
Admission Criteria for Other Application Types (p. 55)
Academic Fresh Start Policy (p. 56)
Enter to a Major – Dwight Look College of Engineering (p. 56)
Upper-Level Entry into Colleges of Architecture, Business and Veterinary Medicine and Biomedical Sciences – Biomedical Science (p. 56)
Course Credit (p. 58)
The admission guidelines presented here are for admission to the Spring, Summer or Fall 2016 semester. While they are the best guide available, admission criteria are subject to change. The Office of Admissions website (http://admissions.tamu.edu) contains the admission policies and procedures in effect for 2016 admission.

**Types of Admission and Application Calendars**

<table>
<thead>
<tr>
<th>At the Time of Application</th>
<th>Term</th>
<th>Opening Date</th>
<th>Closing Date</th>
</tr>
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<tbody>
<tr>
<td>Freshman</td>
<td></td>
<td></td>
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<tr>
<td>An applicant who:</td>
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<td></td>
</tr>
<tr>
<td>• is a citizen or permanent resident of the United States or qualifies for Texas residency based on Senate Bill 1528</td>
<td>Spring 2016</td>
<td>Aug. 1, 2015</td>
<td>Oct. 15, 2015</td>
</tr>
<tr>
<td>• is a degree-seeking applicant and is without college credit or</td>
<td>Fall 2016</td>
<td>Aug. 1, 2015</td>
<td>Dec. 1, 2015</td>
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<tr>
<td>• is still in high school, with or without college credit</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Transfer</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>An applicant who:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• is not a citizen or permanent resident of the United States or an applicant for permanent residency</td>
<td>Spring 2016</td>
<td>April 1, 2015</td>
<td>Aug. 1, 2015</td>
</tr>
<tr>
<td>• after high school graduation has never enrolled at a university as an undergraduate degree-seeking student</td>
<td>Fall 2016</td>
<td>Aug. 1, 2015</td>
<td>Dec. 1, 2015</td>
</tr>
<tr>
<td>• is someone who has not graduated from a Texas high school after three years of residence in Texas (if this applies to you, please apply as a U.S. freshman or U.S. transfer applicant.</td>
<td>Spring 2017</td>
<td>April 1, 2016</td>
<td>Aug. 1, 2016</td>
</tr>
</tbody>
</table>

1 Se habla español.
An applicant who:
• is not a citizen or permanent resident of the United States (or applicant for permanent residency) and does not qualify for Texas residency based on Senate Bill 1528
• is an applicant seeking a bachelor’s degree
• has graduated from high-school or equivalent
• has enrolled in a post-secondary institution, and
• is not eligible for readmission (has never enrolled at Texas A&M University as an undergraduate degree-seeking student).

Readmission
An applicant who:
• is a former degree-seeking Texas A&M undergraduate student (including an international student)
• does not have a bachelor’s degree
• did not officially register for the previous semester (excluding summer sessions) at Texas A&M
Readmission does not include applicants whose only previous enrollment at Texas A&M has been as a non-degree student.

Postbaccalaureate Undergraduate
An applicant who:
• has a bachelor’s degree
• wishes to pursue a second undergraduate degree

Non-degree Undergraduate
An applicant who:
• has a bachelor’s degree
• wishes to take specific undergraduate coursework
• does not wish to pursue a degree at Texas A&M

High School Enrichment Program
An applicant who:
• is a high school junior or senior in the Bryan/College Station area
• has a minimum combined Verbal and Math SAT score of 1200 (plus writing component score), or an ACT score of 27 (plus a writing component score)
• has completed all levels of related coursework offered at their high school
Each student is eligible to take 1 (one) course per fall or spring semester, and course registration will be completed by the TAMU advisor. No summer classes are offered at this time. Classes will be held on the Texas A&M University campus. Students and their parents' guardians will be responsible for any lodging or transportation considerations. Admission for this program is on a space-available basis. The applicant pool is competitive, and admission into this program is not guaranteed.

1 An applicant who has enrolled in a post-secondary institution since high school graduation, with or without credit received, must apply as a transfer applicant.

### Items Necessary to Complete an Application File

Please see the Readmission, Postbaccalaureate or Non-degree sections for other items required to complete the transfer application for those types of admission. U.S. citizens completing a non-U.S. high school program should refer to International Admissions for questions concerning transcripts, examination results and foreign credentials.

An application is reviewed to make a decision about admission after all items listed below have been received. The items must be received by the appropriate closing date to assure consideration.

In addition, freshman applicants must show proof of meeting the State of Texas Uniform Admission Policy to qualify for review.

#### Application, preferably submitted electronically via ApplyTexas

- Completed and signed by applicant (if submitting paper application).
- Fax applications will not be accepted.

#### Application Fee (check, money order, Visa, MasterCard, Discover or American Express)—All fees are nonrefundable

- Domestic Undergraduate - $75
- Domestic Graduate - $50
- International - $90
- Checks and money orders should be made payable to Texas A&M University. International checks must be backed by a U.S. bank and be issued in U.S. dollars. The applicant's name and date of birth should be written on the face of checks and money orders.

### Guidelines for requesting application fee waivers:

- Fee waivers are not available for international students.

#### Freshman Waivers

Applicants requesting a fee waiver must submit an SAT/ACT fee waiver request form (must have an original signature from both the applicant and the counselor issuing the waiver), or submit documentation of need via a memo on school letterhead signed by the high school counselor. Typically, need is defined by qualification for free lunch programs. We recommend the correct form or letter be uploaded through the Applicant Information System (AIS) page. Copies, email attachments, or faxes of these forms will not be accepted. The original document is required, if it is not uploaded in AIS. **Checking the fee waiver box on the application does not satisfy the fee waiver requirement.** You must provide documentation of need as noted above. The application should be submitted prior to submitting fee waiver documents.

If the document is not uploaded, you may mail it to the following address:

Texas A&M University
Freshman Admissions
P. O. Box 30014
College Station, TX 77842-3014
Transfer or Readmit Waivers

To request a fee waiver, please provide a copy of an award letter from your current institution or your Student Aid Report (SAR), which you will find within your current FAFSA. Checking the fee waiver box on the application will not satisfy the fee waiver requirement.

The documents can be uploaded through the Applicant Information System (AIS) page. Documents will also be accepted by fax at (979)458-4302 or email at d-nichols@tamu.edu, as well as U.S. mail.

Essays

- Freshman applicants are required to complete Essay Topics A and B. Essay Topic C is strongly recommended for applicants to be considered in the holistic review process.
- Transfer applicants are required to complete Essay Topic A.

SAT or ACT Scores

- Required of all freshman applicants, including all international freshman applicants.
- SAT/ACT tests must be taken with the writing component in order to be considered.
- Scores should be sent directly from the testing agency.
- The SAT code is 6003; the ACT code is 4198.
- Test scores with the writing component must be from a test date within five years of the date of planned enrollment.
- The highest test score from one test date will be used. Texas A&M does not allow combined test scores from different test dates.

Official High School Transcripts

- Freshman applicants who have not graduated from high school at the time of application must submit an official transcript indicating coursework, credits earned, grades, graduation plan/ diploma type and a numerical class rank at least through their junior year. If admitted, the applicant will be required to submit a final transcript with graduation data.
- If the applicant’s high school does not rank its students, a school profile from the high school must be provided as part of the application file.
- Freshman and transfer applicants who have graduated from high school at the time of application should submit an official high school transcript that includes grades and credits for all completed coursework, a numerical class rank, date of graduation and graduation plan completed, or a certificate verifying completion of a GED program.
- Readmit and postbaccalaureate applicants are not required to submit a high school transcript as part of the application file.
- To be considered official, a transcript must bear an original signature of a school official or an original school seal.
- Transcripts in a language other than English must be accompanied by an official English translation. Applicants who have attended high school both in the U.S. and out of the U.S. should submit official transcripts from each school attended.
- For students enrolled in the U.S., copies of official transcripts from other countries will be accepted provided the copies are on file and verified by the U.S. institution.
- Faxed copies are not official and will not be accepted.

Official College Transcripts

- An official transcript is required from every post-secondary institution attended even if the applicant did not earn credit, receive a course grade or the course is not transferable. Coursework from one college posted on the transcript of another college will not satisfy this requirement. Failure to acknowledge attendance and provide transcripts from all schools attended may be considered a fraudulent admissions application resulting in a denial of the application. A college transcript for dual credit coursework earned in high school must also be provided.
- Official transcripts on paper are to be sent by the sending institution in a sealed envelope. The transcript will not be considered official if the student has had access to the actual transcript.
- Transcripts in a language other than English must be accompanied by an official English translation.
- Faxed copies are not official and will not be accepted.
- For students enrolled in the U.S., copies of official transcripts from other countries will be accepted provided the copies are on file and verified by the U.S. institution.

Lawful Permanent Residents of the United States

An applicant who has applied for or been granted Lawful Permanent Resident (LPR) status in the United States by the Department of Homeland Security (DHS) is eligible to submit an application as a Domestic Applicant. To qualify, you must include one of the following with the application:

- a copy of both sides of the DHS-issued Permanent Resident Card, or
- the I-551 Entry Stamp and Immigrant Visa in the passport, or
- an approved I-797 Notice of Action or I-797C Notice of Receipt.

If your parent is also a permanent resident, a copy of the parent’s proof of LPR status will be necessary to determine in-state residency for tuition purposes.

Note: If you have applied for adjustment of status to Lawful Permanent Residency and have not received your LPR card or Notice of Action that says Notice Type: Approval Notice, you are considered an international student once you are admitted to the University. There are certain requirements that international students must fulfill upon enrollment. Please contact International Student Services at iss@tamu.edu for more information about these requirements.

Required Immunizations

Texas Education Code (TEC) 51.9192 requires all entering students (under the age of 22) to provide evidence of vaccination against bacterial meningitis received within the last 5 years or a signed affidavit declining the vaccine at least 10 days prior to the start of classes for any given semester. Learn more about bacterial meningitis at http://admissions.tamu.edu/meningitis.aspx.

Notification of Application Status

Check the Applicant Information System (AIS) website in Howdy (http://howdy.tamu.edu). Applicant channel, to verify your application has been received and to determine if any credentials are missing. Please allow at least two weeks to process credentials.
The Office of Admissions will make every effort to inform applicants of incomplete files through AIS. If incomplete credentials are received within one month of the closing date, there may not be sufficient time for the Office of Admissions to notify applicants. All items necessary to complete an application must be received by the Office of Admissions by the closing date to assure consideration for admission.

Required Coursework

Applicants who graduate from an accredited Texas public or private high school applying to Texas A&M University must have completed either the State of Texas recommended or advanced/distinguished high school curriculum. Students graduating under the Foundation High School Program are encouraged to complete the Distinguished Level of Achievement with one or more endorsements. The high school curriculum should be noted on the official high school transcript. Please visit [http://admissions.tamu.edu/freshman/coursework](http://admissions.tamu.edu/freshman/coursework) for a complete description of coursework including information for home-schooled and out-of-state applicants.

State of Texas Uniform Admission Policy

Texas Education Code (TEC) 51.803-51.809 (State of Texas Uniform Admission Policy [http://admissions.tamu.edu/freshman/TexasUAP]) requires that all freshman applicants meet one of the following college readiness standards in order to be eligible to be considered for admission at a Texas four-year public institution:

- Satisfy the College Readiness Benchmarks on the SAT or ACT assessment; or
  - SAT – 1500 out of 2400 (Verbal + Math + Writing)
  - ACT – 18 English, 21 Reading, 22 Mathematics and 24 Science

- Successfully complete the State of Texas foundation, recommended or advanced/distinguished high school program or complete the portion of the program that was available to them; or

- Successfully complete a curriculum that is equivalent in content and rigor to the foundation, recommended or advanced/distinguished high school program at a high school that is exempt from offering such programs.

Additional Information for Freshman Applicants

1. Information Presented in the Application
   - Extracurricular activities including time commitment and duration of involvement
   - Leadership and/or exceptional talent as shown in extracurricular activities and/or work
   - Community/volunteer work including time commitment and duration of involvement
   - Awards and achievements earned while in high school
   - Employment and/or internships including dates of work and hours per week
   - Family educational background and household income
   - Number of people in household

2. Essay Topics A and B
   - Essay Topics A and B on the ApplyTexas Application are required for admission processing. Essay Topic C is recommended for applicants in the holistic review process. Scholarship review by departments may utilize Essay Topics A, B and C in award decisions. Those applying for the Terry Scholarship are required to complete Essay Topic C.

Freshman Admissions

When all credentials necessary to complete a freshman applicant’s file are received during the admission application period, one of the following criteria will be used to determine who will be offered admission:

1. Top 10% Applicants from Texas High Schools
   - Applicants who are Texas residents or who are enrolled in recognized public or private high schools in Texas with a rank in the top 10% of their high school graduating class will be automatically admitted to Texas A&M University if they have successfully met the State of Texas Uniform Admission Policy, but not necessarily to the major of choice. These applicants must submit all required credentials by the closing date in order to qualify for automatic admission.

2. Academic Admits
   - Applicants who rank in the top 25% of their high school graduating class, achieve a combined SAT math and SAT critical reading score of at least 1300, with a test score of at least 600 in each of these components of the SAT, or a composite ACT score of at least 30 with a test score of at least 27 in ACT math and ACT English, have successfully completed all recommended coursework and have successfully met the State of Texas Uniform Admission Policy will be automatically admitted to Texas A&M University, but not necessarily to the major of choice. These applicants must submit all required credentials by the closing date to qualify for automatic admission.

3. Other Applicants
   - Applicants not meeting the above requirements for automatic admission but who have met the state of Texas Uniform Admission Policy will have their complete application file reviewed in a holistic manner to make an admission decision.

Information for all Freshman Applicants

- All applicants should use the application questions and the essays to present their academic background and personal strengths as well as personal circumstances.
- Letters of recommendation are not required. If an applicant chooses to submit letters of recommendation, be sure they validate or certify leadership, exceptional talent or special circumstances. The most helpful letters are from individuals who know the applicant well and who can write about what distinguishes the individual from other applicants. Please submit no more than two letters of recommendation. Photocopies are acceptable.
- A competitive applicant who cannot be admitted to a major with restricted enrollment (Colleges of Architecture, Business, Engineering, Liberal Arts, and Public Health) will be offered admission to their second major choice. If the second major choice is full, then an alternate major must be chosen after admission to the university.

Notice of Admission Decision

Texas A&M University receives many more academically prepared applicants for admission than we can accommodate. Admission decisions are made throughout the application period and announced as soon as possible. A final decision may be not announced until early December for spring admission or late March for summer or fall admission. A limited number of applicants may be offered provisional admission that requires the successful completion of a summer school program at Texas A&M. In addition, some applicants may be considered for the Texas A&M Blinn
TEAM Program (http://blinnteam.tamu.edu), Texas A&M Engineering Academy at Blinn-Bryan (http://engineering.tamu.edu/academies/blinn-bryan), or participation in the Program for System Admission (http://admissions.tamu.edu/PSA).

**Suspected Fraudulent Admission Applications**

Applicants for admission to Texas A&M University should be aware that the information submitted will be relied upon by University officials to determine their status for admission and residency for tuition purposes. By signing and submitting an admission application, the applicant certifies that the information in, and submitted with, the application is complete and correct and may be verified by Texas A&M University.

All students applying to Texas A&M University are expected to follow the Aggie Code of Honor which states “An Aggie does not lie, cheat or steal nor tolerate those who do.” Applicants found to have misrepresented themselves or submitted false information on the application will receive appropriate disciplinary action which may include rejection of the application, withdrawal of any offer of acceptance, cancellation of enrollment or any other appropriate disciplinary action deemed necessary. In all instances of disciplinary action, the application fee is non-refundable.

Pursuant to the 2015-2016 undergraduate catalog and Texas A&M student rule 24.4.1 (http://student-rules.tamu.edu/rule24), acts of dishonesty include but are not limited to:

- Withholding material information from the University, misrepresenting the truth during a University investigation or student conduct conference, and/or making false statements to any University official.
- Furnishing false information to and/or withholding information from any University official, faculty member, or office.
- Forgery, alteration, or misuse of any University document, record, or instrument of identification.

For prospective undergraduate students (admitted but not enrolled), the initial determination of whether an individual has submitted a fraudulent application will be made by the Associate Director of Admissions, with a right of appeal to the Assistant Vice President for Academic Services and Director of Admissions for undergraduate students. All appeals will be considered by Admissions Decisions Appeals Committee and a recommendation made to the Assistant Vice President for Academic Services and Director of Admissions. For prospective graduate students, initial appeals will be made to the Dean of Graduate Studies.

For enrolled students, the initial determination of whether a student submitted a fraudulent application will be made by the Registrar, with a final right of appeal to the University Disciplinary Appeals Panel or to the Graduate Appeals Panel.

Any University official who suspects that a prospective student or enrolled student has submitted a fraudulent admission application must notify the Director of Admissions or the Office of the Registrar.

**Transfer Admissions**

Transfer applicants will be reviewed and receive a decision from the college/major to which they have applied. Prospective applicants are encouraged to follow the curriculum and guidelines outlined by that specific college/major.

With the changes to the 2014-2015 University Core Curriculum, the Degree Tracks previously used for transfer admission are no longer valid. Coursework for desired majors is available on the Transfer Course Sheets at http://admissions.tamu.edu/transfer/majors. It is to a student’s advantage to follow the guidelines and complete courses as outlined on the Transfer Course Sheets and in the catalog. Applicants who begin a set of courses which have a two-semester sequence are encouraged to complete both courses in the sequence before applying to transfer to Texas A&M.

**Admission Criteria**

- Transfer applicants must have at least a 2.5 grade point ratio (GPR) on at least 24 graded semester hours of transferable coursework at the time of application to be reviewed for admission.
- Students with less than a 2.5 GPR and/or less than 24 graded transferable hours will be denied admission.
- Transfer admission decisions are made by the college and major and are competitive; thus, admission standards are not known until the review for admission occurs. Preference is given to the applicant with the highest grade point ratio (GPR) and the most courses completed for the major designated on the application. See the College Specific Information for the college of the major for which you applied.
- Applicants who drop or withdraw from courses frequently and who do not routinely achieve satisfactory grades will be at a disadvantage in the review for admission.
- Spring grades may be used in the fall admission decision if requested by the Academic College or in instances where the student did not meet the university requirements for review. Spring transcripts must be received by June 1 for review with spring grades. A complete application must be on file by March 1, 2016, to be considered for fall admission. Spring grade review is not an option for students studying outside the U.S.
- The entire application, including essay topic A, is considered to identify admissible candidates.
- Some colleges consider second choice majors. While such admissions may be more competitive since they are made after applicants indicating that major as first choice, the admission decision follows the guidelines for that college presented in College Specific Information. Note that several colleges do not consider second choice majors.

**Automatic Transfer Admission through SB 175**

A transfer applicant who graduated from a Texas high school and ranked in the top 10% of the student’s high school qualifies for automatic transfer admission to a 4-year university under the provisions of SB 175 if they meet the following guidelines:

1. The applicant must have graduated in the top 10% of his or her high school graduating class from a Texas high school not more than 4 years prior to the semester for which the student is applying. The top 10% ranking must be stated on the final high school transcript, or the applicant must have been previously offered admission under the top 10% rule to the institution to which the applicant seeks admission as a transfer student.
2. The applicant must complete the core curriculum at a public junior college or other public or private lower-division institution with a 2.5 GPR on a four-point scale or equivalent.
3. Transcript should note core completion.
4. The applicant must expressly and clearly claim in the application that he or she is seeking admission under the transfer top 10% rule (SB 175).
5. The applicant must provide all of the documents required for transfer admission to Texas A&M by the posted deadline. Transfer requirements can be found at http://admissions.tamu.edu/transfer.

Applicants qualifying for transfer top 10% admission under SB 175 will be admitted to Texas A&M but the choice of major is not guaranteed. Students desiring admission to Business or Engineering are encouraged to select a second choice major of interest due to the limited enrollment capacity in these colleges.

For information concerning the Transfer Top 10% Admission, please see www.legis.state.tx.us/tlodocs/81R/billtext/doc/SB00175F.doc.

College Specific Information
College of Agriculture and Life Sciences

Admission requirements vary greatly across the College; therefore, it is highly recommended that prospective students contact the academic advisor for the major of interest. Admission decisions are made by major and are competitive. Most majors have a series of required and preferred coursework to be completed by the student prior to application. Students should refer to the Texas A&M University Admissions (http://admissions.tamu.edu) website to review the transfer guides for each major. Also note that transfer admission GPR requirements vary by major and several exceed the minimum 2.5 GPR. Completion of the essay indicating why the major was selected and how a degree in this major will help meet career goals is required. For more information on transfer guidelines, coursework and contact information for all academic advisors, refer to the College of Agriculture and Life Sciences (http://aglifesciences.tamu.edu) website.

College of Architecture

Applicants must have completed 24 hours of transferable coursework at the time of application, and it is recommended that these courses be selected from the degree program electives described elsewhere in this catalog. The essay is an important component in the review process and should explain why the applicant is interested in either the Construction Science, Environmental Design Architectural Studies, Landscape Architecture, Urban and Regional Planning or Visualization program. Applicants with less than a 3.0 GPR are rarely admitted. For more information, visit the College of Architecture (http://www.arch.tamu.edu) website.

Enrollment in Environmental Design Architectural Studies and Visualization is driven by available studio space. Additionally, there are eight sequential studios in those degree programs which make it difficult for students that transfer with more than 36 hours.

<table>
<thead>
<tr>
<th>Degree</th>
<th>Applicable Majors</th>
<th>Courses</th>
<th>TCCNS Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban and Regional Planning, Landscape Architecture</td>
<td>Landscape Architecture, Urban and Regional Planning, University Studies</td>
<td>ENGL 104, MATH 141&lt;sup&gt;1&lt;/sup&gt;, PHYS 201 or CHEM 101</td>
<td>ENGL 1301, MATH 1324, PHYS 1302 and PHYS 1102</td>
</tr>
<tr>
<td>Environmental Design Architectural Studies, Construction Science</td>
<td>Environmental Design Architectural Studies, Construction</td>
<td>ENGL 104, MATH 141&lt;sup&gt;1&lt;/sup&gt;, PHYS 201</td>
<td>ENGL 1301, MATH 1324, PHYS 1302</td>
</tr>
</tbody>
</table>

<sup>1</sup> In lieu of MATH 1324 and MATH 1325, Mays accepts MATH 2414 and MATH 2413, respectively.

Mays Business School

Mays Business School offers transfer admission to the most competitive applicants. The transfer admission process identifies applications that evidence outstanding accomplishments, including academic credentials using the following guidelines.

Transfer admission to Mays generally requires excellence in the following set of eight specific courses. Applicants desiring to major in business are encouraged to plan early, and incorporate this entire body of coursework into their curriculum prior to applying. It is especially important to have credit for both required math courses before applying.

No spring admissions are offered. Summer and fall applicants are expected to have completed and excelled in substantially all of the 24 semester hours of Priority Coursework. Due to the competitiveness of the applicant pool, successful applicants will have a combination of As and Bs in this coursework and a high overall GPR.

The entire application is reviewed. Successful applicants include carefully written essays that demonstrate clarity of purpose, creativity, and an advanced writing style. Applicants are encouraged to identify their intended upper-level major and to describe why they are well suited for that area of specialization. Applicants who have special circumstances they wish to discuss are urged to share all pertinent information, with appropriate documentation, in their essay(s).

Priority courses to be completed before transfer application to Mays Business School are:

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>TCCNS Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 229</td>
<td>Intro. Acct. - Financial</td>
<td>ACCT 2301, ACCT 2401</td>
</tr>
<tr>
<td>ACCT 230</td>
<td>Intro. Acct. - Managerial</td>
<td>ACCT 2302, ACCT 2402</td>
</tr>
<tr>
<td>ECON 202</td>
<td>Principles of Economics - Microeconomics</td>
<td>ECON 2302</td>
</tr>
<tr>
<td>ECON 203</td>
<td>Principles of Economics - Macroeconomics</td>
<td>ECON 2301</td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td>SPCH 1315</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>ENGL 1302</td>
</tr>
<tr>
<td>MATH 141&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Bus. Math I - Finite Math</td>
<td>MATH 1324</td>
</tr>
<tr>
<td>MATH 142&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Bus. Math II - Calculus</td>
<td>MATH 1325</td>
</tr>
</tbody>
</table>

<sup>1</sup> MATH 1324 from some colleges will not be a direct equivalent to MATH 141 at Texas A&M University but will satisfy the core math requirement for this major.
College of Education and Human Development

The College of Education and Human Development (CEHD) is actively seeking qualified transfer students who are interested in teacher certification. There is a nationwide demand for teachers. In particular, the College is seeking students interested in high-need teaching fields: math, science, special education, bilingual, English as a Second Language, and foreign language. The College also offers a variety of non-certification programs.

To be competitive for admission, an applicant should, at the time of application, have a minimum 2.75 GPA on at least 24 hours of graded transferable coursework. It is preferred that MATH 141/MATH 1324, MATH 142/MATH 1325 and two science courses from the desired major be taken prior to application.

Students interested in certification at grades 8–12 should complete a baccalaureate degree in a discipline area and contact the College regarding certification. The College of Education and Human Development will consider second-choice majors with the exception of majors housed in the Department of Health and Kinesiology.

Recommended Courses. Prospective transfer students should refer to the College of Education and Human Development (http://education.tamu.edu) website to identify additional courses that will satisfy degree requirements. Any student applying for a degree in Allied Health or Kinesiology is encouraged to apply with under 60 total hours of transfer credit. Applicants should refer to the College website for more information.

The College of Education and Human Development evaluates performances in all courses and considers all parts of the application. If you have repeatedly dropped or withdrawn from courses or if you are taking courses that do not apply to the Core Curriculum or your major, they may have a negative impact when the application is reviewed. A well-written essay is a student’s opportunity to share information and experiences that could indicate success in a particular major.

The college has identified the following 31 hours of coursework as transferable for all CEHD majors:

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>TCCNS Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 111</td>
<td>Intro. to Biology</td>
<td>BIOL 1406</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Intro. to Rhetoric and Composition</td>
<td>ENGL 1302</td>
</tr>
<tr>
<td>HIST 105 or HIST 106</td>
<td>American History</td>
<td>HIST 1301 or HIST 1302</td>
</tr>
<tr>
<td>HIST 226</td>
<td>Texas History</td>
<td>HIST 2301</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Business Math I</td>
<td>MATH 1324</td>
</tr>
<tr>
<td>MATH 142</td>
<td>Business Math II</td>
<td>MATH 1325</td>
</tr>
<tr>
<td>THAR 101</td>
<td>Intro. to Western Theatre and Drama</td>
<td>DRAM 1310</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American Government</td>
<td>GOVT 2305</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>GOVT 2306</td>
</tr>
</tbody>
</table>

1 MATH 1324 from some colleges will not be a direct equivalent to MATH 141 at Texas A&M University but will satisfy the core math requirement for this major.

Guidelines for Transfer Applicants by Program

Health. Applicants who are seeking transfer admission to this program should complete BIOL 1406, CHEM 1411, MATH 1324 and MATH 1325 for admission. Other prerequisite coursework that is recommended is SPCH 1315; and PHED 1304. Students may also take BIOL 2401 and BIOL 2402 to substitute for BIOL 319 and BIOL 320 for this option.

Kinesiology–Exercise Science. Students in this program are encouraged to complete at least 24 hours of the science coursework prior to the 60 completed hours. The Texas Common Course Numbers for the required science coursework on the exercise science degree plan (Applied Exercise Physiology, Basic Exercise Physiology and Motor Behavior options in the Kinesiology degree) are BIOL 1406, BIOL 1407, CHEM 1411, CHEM 1412, PHYS 1401 and PHYS 1402. The remaining 8 hours (Anatomy and Physiology I and II) must be taken at Texas A&M. Other coursework that students could complete include MATH 1324 and MATH 1325 (required for transfer); ENGL 2311 or SPCH 1315; and PHED 1301.

Kinesiology–Physical Education Teacher Certification. Applicants who are seeking transfer admission to this program should complete BIOL 1406, PHYS 1401, MATH 1324 and MATH 1325. Other prerequisite coursework that can be taken prior to admission to Texas A&M and the program and is recommended is ENGL 1301 or ENGL 2311; and PHED 1301. Students may also take BIOL 2401 and BIOL 2402 to substitute for BIOL 319 and BIOL 320 for this option.

Sport Management. Applicants who are seeking transfer admission to this program should complete two lab sciences that meet TAMU Core Curriculum which could consist of the following science courses: BIOL 1406, GEOL 1403, CHEM 1411 or PHYS 1401. Check with the Office of Admissions for specific courses that may meet this requirement. MATH 1324 and MATH 1325 are also required for admission. Other recommended coursework includes ENGL 1301 or ENGL 2311 and SPCH 1315; and ECON 2302.

For more information about admission to the College of Education and Human Development, please contact Casey Ricketts at cricketts@tamu.edu.

Dwight Look College of Engineering

Applicants should complete at least 24 hours of graded transferable coursework at the time of submitting their application, all with a grade of C or better. Transfer admission GPA requirements vary by major, with the majority exceeding the minimum requirements for transfer admission consideration to Texas A&M. Transfer admission course requirements also vary by major. Successful applicants for undergraduate engineering degree programs in the Dwight Look College of Engineering will have completed all or most of the coursework listed before applying for transfer admission. Prospective transfer students should review prospective student information accessed through the Dwight Look College of Engineering (http://engineering.tamu.edu) website for more information and details specific to each major.

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>TCCNS Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104 (3hrs)</td>
<td>Comp. and Rhetoric</td>
<td>ENGL 1302</td>
</tr>
<tr>
<td>MATH 151 (4 hrs)</td>
<td>Engineering Math I</td>
<td>MATH 2413</td>
</tr>
</tbody>
</table>

2 MATH 1324 from some colleges will not be a direct equivalent to MATH 141 at Texas A&M University but will satisfy the core math requirement for this major.
### College of Geosciences

Prospective applicants are encouraged to refer to the College of Geosciences (http://geosciences.tamu.edu) website for details on appropriate coursework for their intended major which must be completed prior to the time of application. Applicants in Meteorology must have a B or better in all mathematics and science courses required for this major. Special attention is paid to performance in courses relevant to the student’s prospective major. Applicants are considered for fall and spring only. The College of Geosciences will consider second-choice majors.

Overall, the College of Geosciences requires prospective transfer students to be in the process of completing a minimum of 24 hours from the list of courses provided here with a minimum cumulative GPR of 3.0. Applicants are expected to have excelled in this body of coursework, to present evidence of success in a course in their selected major, and in the mathematics and science courses specified.

The entire application submitted by transfer students is reviewed. Successful applicants include carefully written essays that demonstrate clarity of purpose and an advanced writing style. In the essay, applicants are advised to identify their intended major within the College of Geosciences and to describe why they are committing to study that subject. Applicants who have special circumstances and wish to discuss them are urged to share all pertinent information, with appropriate documentation, in their essay(s).

Each major requires the courses as listed below:

<table>
<thead>
<tr>
<th>Applicable Majors</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Studies (ENST) B.S.</td>
<td>At least one course selected from: GEOG 1302, 1303, GEOL 1303 and 1103, 1403 or other introductory courses in the Geosciences (Geography, Geology, Atmospheric Science, Oceanography) Two Math courses: MATH 1324 and 1325 One Science course selected from: BIOL 1306 and 1106, 1406 CHEM 1311 and 1111, 1411</td>
</tr>
<tr>
<td>Environmental Geosciences (ENGS) B.S.</td>
<td>At least one course selected from: GEOG 1302, 1303, GEOL 1303 and 1103, 1403 or other introductory courses in the Geosciences (Geography, Geology, Atmospheric Science, Oceanography) Two Math courses: MATH 2413 and 2414 One Science course selected from: BIOL 1306 and 1106, 1406 CHEM 1311 and 1111, 1411, 1401</td>
</tr>
<tr>
<td>Geography (GEOG) B.S. University Studies - Geography (USGE) B.S. Geographic Information Science and Technology (GIST) B.S.</td>
<td>One course selected from: GEOG 1301, 1302 or 1303, or the equivalent to GEOG 203 (Earth Systems Science) Two Math courses: MATH 1324 and 1325 One Science course selected from: BIOL 1306 and 1106, 1406 GEOL 1403 CHEM 1311 and 1111, 1411 PHYS 1301 and 1101, 1401</td>
</tr>
<tr>
<td>Geology (GEOL) B.A.</td>
<td>GEOL 1303 and 1103 or 1403 Two Math courses: MATH 1324 and 1325 One Science course selected from: BIOL 1306 and 1106, 1406 GEOL 1403 CHEM 1311 and 1111, 1411, 1412 PHYS 1301 and 1101, 1401</td>
</tr>
<tr>
<td>Geology (GEOL) B.S.</td>
<td>GEOL 1303 and 1103 or 1403 These four Math/Science courses: MATH 2413, 2414, CHEM 1411, 1412</td>
</tr>
<tr>
<td>Geophysics (GEOP) B.S.</td>
<td>GEOL 1303 and 1103 or 1403 These four Math/Science courses: MATH 2413, 2414; PHYS 2325 and 2125, PHYS 2326 and 2126</td>
</tr>
<tr>
<td>Meteorology (METR) B.S.</td>
<td>MATH 2413, 2414; PHYS 2425, CHEM 1411, 1412 (These courses must be completed with a B or better.)</td>
</tr>
</tbody>
</table>

### College of Liberal Arts

Applicants will be considered on their overall GPA on at least 24 hours of graded transferable coursework with a minimum GPA of 3.0 at the time of application. Applicants should complete the essay indicating why they are interested in admission into the selected major. Academic performance in courses relevant to the student’s prospective major may also be considered in admissions decisions. ECON, PSYC and INTS applicants have prerequisites that must be met prior to admission. Refer to
this catalog for all electives in each curriculum. For more information about majors, programs and curricular requirements, please refer to this catalog and the College of Liberal Arts (http://liberalarts.tamu.edu) website.

**College of Science**

Applicants should complete 24 hours, as appropriate to the choice of major, with a cumulative GPR of at least 3.00. Strength of schedule is a factor in determining admission. Applicants will not be admitted without the completion of the first two semesters of courses in their declared major with a grade of B or better. Chemistry and Physics majors must also complete 8 hours of Calculus I and II with a grade of B or better. Biology students must complete 8 hours of Chemistry I and II with a grade of B or better and Calculus I and II with a grade of C or better. The College of Science will consider second-choice majors. For more information, visit the College of Science (http://www.science.tamu.edu) website.

The transfer admission guidelines by major in the College of Science include:

**Biology**

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>TCCNS Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 111(^1)</td>
<td>Introductory Biology I</td>
<td>BIOL 1306 and 1106, 1406</td>
</tr>
<tr>
<td>BIOL 112(^2)</td>
<td>Introductory Biology II</td>
<td>BIOL 1307 and 1107, 1407</td>
</tr>
<tr>
<td>CHEM 101/CHEM 111(^1)</td>
<td>Fundamentals of Chem. I/ Lab</td>
<td>CHEM 1311 and 1111, 1411</td>
</tr>
<tr>
<td>CHEM 102/CHEM 112(^2)</td>
<td>Fundamentals of Chem. II/ Lab</td>
<td>CHEM 1312 and 1112, 1412</td>
</tr>
<tr>
<td>MATH 151(^1)</td>
<td>Engineering Math I</td>
<td>MATH 2413</td>
</tr>
<tr>
<td>MATH 152(^1)</td>
<td>Engineering Math II</td>
<td>MATH 2414</td>
</tr>
</tbody>
</table>

**Chemistry**

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>TCCNS Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 101/CHEM 111(^1)</td>
<td>Fundamentals of Chem. I/ Lab</td>
<td>CHEM 1311 and 1111, 1411</td>
</tr>
<tr>
<td>CHEM 102/CHEM 112(^2)</td>
<td>Fundamentals of Chem. II/ Lab</td>
<td>CHEM 1312 and 1112, 1412</td>
</tr>
<tr>
<td>ENGL 104(^2)</td>
<td>Composition and Rhetoric</td>
<td>ENGL 1302</td>
</tr>
<tr>
<td>HIST 105(^2)</td>
<td>History of the U.S.</td>
<td>HIST 1301</td>
</tr>
<tr>
<td>HIST 106(^2)</td>
<td>History of the U.S.</td>
<td>HIST 1302</td>
</tr>
<tr>
<td>MATH 151(^1)</td>
<td>Engineering Math I</td>
<td>MATH 2413</td>
</tr>
<tr>
<td>MATH 152(^1)</td>
<td>Engineering Math II</td>
<td>MATH 2414</td>
</tr>
</tbody>
</table>

**Mathematics**

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>TCCNS Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104(^2)</td>
<td>Composition and Rhetoric</td>
<td>ENGL 1302</td>
</tr>
<tr>
<td>ENGL 210(^2)</td>
<td>Scientific/Technical Writing</td>
<td>ENGL 2311</td>
</tr>
<tr>
<td>MATH 151(^1)</td>
<td>Engineering Math I</td>
<td>MATH 2413</td>
</tr>
<tr>
<td>MATH 152(^1)</td>
<td>Engineering Math II</td>
<td>MATH 2414</td>
</tr>
<tr>
<td>PHYS 218(^2)</td>
<td>Mechanics</td>
<td>PHYS 2325 and 2125, 2425</td>
</tr>
</tbody>
</table>

\(^1\) A grade of B or better is required on all courses. Requirements also include a cumulative GPA of 3.00 or better.

\(^2\) Meets major requirement. May be taken as time permits.

**Physics**

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>TCCNS Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 101/CHEM 111(^2)</td>
<td>Fundamentals of Chem. I/ Lab</td>
<td>CHEM 1311 and 1111, 1411</td>
</tr>
<tr>
<td>ENGL 104(^2)</td>
<td>Composition and Rhetoric</td>
<td>ENGL 1302</td>
</tr>
<tr>
<td>MATH 151(^1)</td>
<td>Engineering Math I</td>
<td>MATH 2413</td>
</tr>
<tr>
<td>MATH 152(^1)</td>
<td>Engineering Math II</td>
<td>MATH 2414</td>
</tr>
<tr>
<td>PHYS 218(^2)</td>
<td>Mechanics</td>
<td>PHYS 2325 and 2125, 2425</td>
</tr>
<tr>
<td>PHYS 208(^2)</td>
<td>Electricity</td>
<td>PHYS 2326 and 2126, 2426</td>
</tr>
</tbody>
</table>

**College of Veterinary Medicine and Biomedical Sciences**

Applicants should have a 3.00 GPR on at least 45 hours of graded transferable coursework at the time of application and meet all Common Body of Knowledge (CBK) requirements for Biomedical Sciences in order to be considered for admission into Biomedical Sciences. Students who begin a set of courses which have a two-semester sequence are encouraged to complete both courses in the sequence before transferring to Texas A&M. No second-choice majors are considered. No summer admissions accepted. For more information, visit the College of Veterinary Medicine and Biomedical Sciences (http://vetmed.tamu.edu) website.

Transfer students with 45 or more hours completed at the time of application will be given preference in admission. The transfer into Biomedical Sciences must occur before the student reaches 75 completed hours.

Readmits will require a 3.0 at Texas A&M University and all CBK courses completed with at least a “C” in all courses. Any CBK courses transferred in from a community college must have a minimum grade of a “B”.

**CBK Requirements**

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>TCCNS Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 111</td>
<td>Intro. to Biology I</td>
<td>BIOL 1306 and 1106, 1406</td>
</tr>
<tr>
<td>BIOL 112</td>
<td>Intro. to Biology II</td>
<td>BIOL 1307 and 1107, 1407</td>
</tr>
<tr>
<td>CHEM 101/CHEM 111</td>
<td>Fundamentals of Chem. I</td>
<td>CHEM 1311 and 1111, 1411</td>
</tr>
<tr>
<td>CHEM 102/CHEM 112</td>
<td>Fundamentals of Chem. II</td>
<td>CHEM 1312 and 1112, 1412</td>
</tr>
<tr>
<td>CHEM 227/CHEM 237</td>
<td>Organic Chem. I/ Lab</td>
<td>CHEM 2323 and 2123, 2423</td>
</tr>
<tr>
<td>CHEM 228/CHEM 238</td>
<td>Organic Chem. II/ Lab</td>
<td>CHEM 2325 and 2125, 2425</td>
</tr>
</tbody>
</table>
| MATH 131 | Calculus\(^1\) | }
Students may choose to take MATH 2413 or MATH 1325 as calculus for transfer. These are equivalent to TAMU course numbers MATH 151 and MATH 142, respectively.

Notification of Admission Decisions
Transfer admission decisions are made through a competitive review process. These applicants are notified of the admission decision on a rolling basis throughout the application season. For those applicants submitting spring grades for fall consideration, decisions should be announced by early July.

Additional Information for Transfer Applicants
1. Applicants to the Colleges of Architecture, Business and Veterinary Medicine and Biomedical Sciences—Biomedical Sciences should refer to the Upper Level Entry requirements. Applicants to the Dwight Look College of Engineering should refer to the Entry to a Major – Dwight Look College of Engineering requirements.

2. At least a 2.0 GPR on coursework in progress during the semester (excluding summer terms) immediately prior to enrollment at Texas A&M is a condition of admission.

3. Grades for all transferable courses are used in the computation of the GPR. This includes:
   - Failing grades, repeated courses, WF, Incomplete, etc.
   - Grades reported as Incomplete are computed as Fs.
   - Plus and minus grade designations are not used; C+ is computed as a C, B- as a B, etc.

4. Credit by examination courses which are transcripted from other colleges or universities may be transferred if sequential coursework with credit is also indicated. If there is evidence that the credit by examination courses are part of the student’s program of study at that institution, credit will be awarded for those courses that meet the transfer guidelines. Note: Credit by examination will not count toward the 24 hours required for consideration for admission.

5. Coursework taken as credit-by-exam must be listed as a specific course on an official college transcript to be considered in the admissions process and for transfer of credit.

Residence Requirement for Baccalaureate Degree
A minimum of 36 hours of 300- and/or 400-level coursework must be successfully completed in residence at Texas A&M University to obtain a baccalaureate degree. In all cases, a minimum of 12 of these 36 semester hours must be in the major.

Abbreviations for Texas A&M Colleges and Majors

<table>
<thead>
<tr>
<th>School/College</th>
<th>Abbrev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>College of Agriculture and Life Sciences</td>
<td>AG</td>
</tr>
<tr>
<td>Agribusiness</td>
<td>AGBL</td>
</tr>
<tr>
<td>Agricultural Communications and Journalism</td>
<td>AGCJ</td>
</tr>
<tr>
<td>Agricultural Economics</td>
<td>AGEC</td>
</tr>
<tr>
<td>Agricultural Leadership and Development</td>
<td>ALED</td>
</tr>
<tr>
<td>Agricultural Science</td>
<td>AGSC</td>
</tr>
<tr>
<td>Agricultural Systems Management</td>
<td>AGSM</td>
</tr>
<tr>
<td>Agriculture and Life Sciences</td>
<td>AGLS</td>
</tr>
<tr>
<td>Animal Science</td>
<td>ANSC</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>BICH</td>
</tr>
<tr>
<td>Bioenvironmental Sciences</td>
<td>BESC</td>
</tr>
<tr>
<td>Biological and Agricultural Engineering</td>
<td>BAEN</td>
</tr>
<tr>
<td>Community Development</td>
<td>CDEV</td>
</tr>
<tr>
<td>Ecological Restoration</td>
<td>ECOR</td>
</tr>
<tr>
<td>Entomology</td>
<td>ENTO</td>
</tr>
<tr>
<td>Environmental Studies</td>
<td>ENST</td>
</tr>
<tr>
<td>Food Science and Technology</td>
<td>FSTC</td>
</tr>
<tr>
<td>Forensic and Investigative Sciences</td>
<td>FIVL</td>
</tr>
<tr>
<td>Forestry</td>
<td>FORS</td>
</tr>
<tr>
<td>Genetics</td>
<td>GENE</td>
</tr>
<tr>
<td>Horticulture</td>
<td>HORT</td>
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<tr>
<td>Nutrition</td>
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<tr>
<td>Plant and Environmental Soil Sciences</td>
<td>PSSC</td>
</tr>
<tr>
<td>Poultry Science</td>
<td>POSC</td>
</tr>
<tr>
<td>Rangeland Ecology and Management</td>
<td>RLEM</td>
</tr>
<tr>
<td>Recreation, Park and Tourism Sciences</td>
<td>RPTS</td>
</tr>
<tr>
<td>Renewable Natural Resources</td>
<td>RENR</td>
</tr>
<tr>
<td>Spatial Sciences</td>
<td>SPSA</td>
</tr>
<tr>
<td>Turfgrass Science</td>
<td>TGSC</td>
</tr>
<tr>
<td>University Studies</td>
<td>USAL</td>
</tr>
<tr>
<td>Wildlife and Fisheries Sciences</td>
<td>WFSC</td>
</tr>
<tr>
<td>College of Architecture</td>
<td>AR</td>
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<tr>
<td>Construction Science</td>
<td>COSL</td>
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<tr>
<td>Environmental Design Architectural Studies</td>
<td>ENDL</td>
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<tr>
<td>University Studies</td>
<td>USAR</td>
</tr>
<tr>
<td>Urban and Regional Planning</td>
<td>URPN</td>
</tr>
<tr>
<td>Visualization</td>
<td>VISL</td>
</tr>
<tr>
<td>Mays Business School</td>
<td>BA</td>
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<tr>
<td>Business Administration (Accounting, Business Honors, Finance, Management, Management Information Systems, Marketing, Supply Chain Management)</td>
<td>BUAD</td>
</tr>
<tr>
<td>University Studies</td>
<td>USBU</td>
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<tr>
<td>Baylor College of Dentistry (Dallas DN campus)</td>
<td>DDHS</td>
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<tr>
<td>Dental Hygiene</td>
<td>DDHS</td>
</tr>
<tr>
<td>College of Education and Human Development</td>
<td>ED</td>
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<tr>
<td>--------------------------------------------</td>
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<tr>
<td>Community Health</td>
<td>CHLL</td>
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<tr>
<td>Health (Health Education, Allied Health, School Health)</td>
<td>EDHL</td>
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<tr>
<td>Human Resource Development</td>
<td>HRDL</td>
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<tr>
<td>Interdisciplinary Studies (Early Childhood-6; Middle School)</td>
<td>EDIS</td>
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<tr>
<td>Interdisciplinary Studies (Special Education, Bilingual)</td>
<td>INST</td>
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<tr>
<td>Kinesiology (Physical Activity)</td>
<td>EDKI</td>
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<tr>
<td>Secondary Education</td>
<td>EDSM</td>
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<tr>
<td>Sport Management</td>
<td>TCMC</td>
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<tr>
<td>Technology Management</td>
<td>USEH</td>
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<td>Dwight Look College of Engineering</td>
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<tr>
<td>Aerospace Engineering</td>
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<tr>
<td>Biomedical Engineering</td>
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<td>CVEN</td>
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<td>Computer Engineering (Computer Science track)</td>
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<tr>
<td>Computer Engineering (Electrical Engineering track)</td>
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<tr>
<td>Computer Science (Computer Science track)</td>
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<td>Mechanical Engineering</td>
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<td>Nuclear Engineering</td>
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<tr>
<td>Ocean Engineering</td>
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<td>Petroleum Engineering</td>
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<td>Radiological Health Engineering</td>
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<tr>
<td>Geographic Information Science and GIST Technology</td>
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<tr>
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<td>USLA</td>
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<td>Applied Mathematical Sciences</td>
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<tr>
<td>Biology</td>
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<td>Molecular and Cell Biology</td>
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<td>Physics</td>
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<td>College of Veterinary Medicine and Biomedical Sciences</td>
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<td>BIMS</td>
</tr>
<tr>
<td>University Studies</td>
<td>USVM</td>
</tr>
</tbody>
</table>

1. See this catalog pertaining to your major for the specific science.
2. Choice available for transfer applicants only. Nursing and Dental Hygiene applicants must have completed or be enrolled in pre-requisite courses at the time of application. Courses may be completed at any accredited college or university.
3. All new students to the Colleges of Architecture, Business, and Public Health enter the lower level.
4. Requires CHEM 102; MATH 141, MATH 151.
5. The curriculum leading to a professional degree in Architecture begins in the four-year undergraduate Environmental Design Architectural Studies degree program. This degree provides entry to the Master of Architecture program.
6. No spring transfer admission.
7. Choice not available for transfer applicants.
All students seeking elementary teacher certification will complete a baccalaureate degree in Interdisciplinary Studies. There is no major in Secondary Teacher Education. All students seeking secondary certification (except those preparing to teach physical education or health) will major in an academic discipline other than education (i.e., mathematics, English, computer science, biology, etc.) and take appropriate coursework for teacher certification in the College of Education and Human Development.

Pre-veterinary medicine is not offered at Texas A&M. If you plan to apply to the Doctor of Veterinary Medicine (DVM) program, you should select a major that would be a good vocational choice if you do not later enter the DVM program. Any major may be selected; however, some curricula more closely parallel courses that must be completed before applying to the DVM program than others.

### Change of Curriculum to Another Campus
Texas A&M offers certain undergraduate degrees at two branch campuses in addition to the main campus. While enrolled as a student in residence at the Texas A&M location of admission, students may apply for a change of curriculum to another campus for the next future semester. Students must comply with the established change of major procedures and requirements of their desired college and department, and space must be available. Final approval is granted by the academic dean or departmental advisor for that major.

### Transfer Course Credit Policies
Transfer credit on coursework complete at the time of application to Texas A&M University is determined only when an official transcript from the originating institution is presented as part of the application for admission or readmission process.

The transfer of course credit will be determined by the Office of Admissions on a course-by-course basis. Credit submitted for transfer must be on an official transcript received by the Office of Admissions from the registrar of the institution where the credit was earned. Course content will be determined from the catalog description or the syllabus. The transfer of credit decision will be based on the following criteria. All criteria are to be considered together; for example, criteria 10 may be qualified by criteria 7.

#### Credit from Institutions Accredited by One of the Regional Accrediting Associations
1. A course that is normally considered as part of a bachelor's degree program (not including the bachelor of technology or similar terminal degree) may be transferred. The following criteria, taken together, are used:
   a. The course is applicable to a bachelor’s degree at Texas A&M.
   b. The course is similar to a course or courses offered for degree credit by Texas A&M.
   c. The course content is at or above the level of the beginning course in the subject matter offered by Texas A&M.

2. A course that is intended for use in a vocational, technical or occupational program will normally not transfer. In certain cases, credit for occupational skill courses will be considered. Transfer of this credit requires either that the student's Texas A&M major is engineering technology or industrial distribution or that the student’s major department and dean approve the course for use in the student’s degree program.

3. Credit for support courses such as Math, Science and English intended specifically for use in an occupational program will not be transferred.

4. Credit for the course must be shown on the official transcript in semester hours or in units that are readily converted to semester hours.

5. A graduate-level course will not be transferred for undergraduate credit unless approved for use in the student’s undergraduate degree program by the student’s major department and Dean. This also applies for a course offered in a professional degree program such as Nursing, Law or Medicine.

6. Credit by examination courses which are transcripted from other colleges or universities may be transferred if sequential coursework with credit is also indicated. If there is evidence that the credit by examination courses are part of the student’s program of study at that institution, credit will be awarded for those courses that meet the transfer guidelines.

7. Courses similar to ones offered by the Colleges of Agriculture and Life Sciences, Business, Engineering or Geosciences at the junior or senior level transfer by title only. Such courses may be used in the student’s degree program only if approved by the Department Head and Dean of the student’s major field. Validation of such credit, either by examination or the completion of a higher level course, may be required.

8. A field experience, internship or student teaching course may be transferred by title only.

9. Credit for cooperative education will not be transferred.

10. A course that is substantially equivalent to a Texas A&M course transfers as an equivalent course. Two or more courses may be combined to form one or more equivalent courses. If there is doubt about the equivalency of a course, the Texas A&M department offering the course subject matter is asked to determine if the course is equivalent.

11. As a general policy, credit for admission will be given for transfer work satisfactorily completed with a passing grade at another properly accredited institution.

12. Grade Point Ratio (GPR) for any period shall be computed by dividing the total number of semester hours of transferable courses for which the student received grades into the total number of grade points earned in that period. Credit hours to which grades equivalent to Texas A&M grades of W, WF, F, I or U are assigned shall be included; those having grades equivalent to Texas A&M grades of WP, Q, S, X and NG shall be excluded.

13. In any case where a decision cannot be made using the above criteria, the Office of Admissions will determine the transfer of credit based on University policy, previous actions of the University and prior experience.

### Resolution of Transfer Disputes for Lower Division Courses Between Public Institutions in Texas
The following procedures shall be followed by public institutions of higher education in the resolution of credit transfer disputes involving lower-division courses:

1. If an institution of higher education does not accept course credit earned by a student at another institution of higher education, the receiving institution shall give written notice to the student and to the sending institution that transfer of the course credit is denied. A
receiving institution shall also provide written notice of the reasons for denying credit for a particular course or set of courses at the request of the sending institution.

2. A student who receives notice as specified in subsection 1 may dispute the denial of credit by contacting a designated official at either the sending or the receiving institution.

3. The two institutions and the student shall attempt to resolve the transfer of the course credit in accordance with the rules and guidelines of the Texas Higher Education Coordinating Board (THECB).

4. If the transfer dispute is not resolved to the satisfaction of the student or the sending institution within 45 days after the date the student received written notice of denial, the institution that denies the course credit for transfer shall notify the Commissioner of its denial and the reasons for the denial.

The Commissioner of Higher Education or the Commissioner’s designee shall make the final determination about the dispute concerning the transfer of course credit and give written notice of the determination to the involved student and institutions.

Credit from Nonaccredited Schools

Students who transfer to Texas A&M from an institution of higher education that is not accredited by one of the regional accrediting associations may validate the work taken at the institution by one of the following methods:

1. Successful completion of a comprehensive departmental examination or nationally standardized examination that is approved by the department.
2. Successful completion of a higher level course in the same subject area when approved by the head of the department and the dean of the college.

Credit will be given to students transferring from nonaccredited public colleges in Texas for work completed with grades of C or better if they earn a grade point of 2.0 (C average) on the first 30 hours of residence work at Texas A&M.

Credit from Foreign Institutions

Transfer work from institutions following other than the United States educational system with instruction in English will be evaluated on an individual basis. A-level examinations with a grade of C or better will transfer. Baccalaureate II examinations will not transfer; however, these students may take placement and proficiency examinations to receive credit by examination. Credit will be given for work satisfactorily completed at international institutions offering programs recognized by Texas A&M. Official credentials submitted directly from the office of the registrar and a listing of courses completed and grades awarded must accompany any request for transfer credit. Transfer work will be awarded by course title unless previous arrangements have been made using the Texas A&M University Transfer Credit Study Abroad Pre-Approval Form. Courses must be equivalent in character and content to courses offered at Texas A&M. Credit will not be awarded from international institutions which are not academically accredited by the Ministry of Education or other appropriate authority in the home country.

No English composition courses will be transferred from institutions located in non-English speaking countries. American history and American political science (government) courses will not transfer from foreign institutions.

Courses taken at language training centers or institutes are generally not awarded transfer credit. A transcript from such an institution must be issued through the office of the registrar at a Texas A&M recognized university, institute or language training center. Credentials of all language training centers and institutes are carefully checked.

Credit for Military Experience

State law (Texas Education Code Section 51.3042) and Texas A&M University policy awards credit for military experience to eligible veterans. To receive credit, student veterans must submit proof of eligibility to the Office of Admissions and a request form through an academic advisor. Texas A&M University awards one credit hour each for physical education courses KINE 198 and KINE 199, and up to 12 credit hours for general electives, as needed for the student’s degree. Credit earned under this policy does not prohibit Texas A&M University from awarding additional credit for military experience based on military transcripts and recommendations contained within Guide to the Evaluation of Educational Experiences in the Armed Services published by the American Council on Education (ACE).

Proof of eligibility includes:

• Documentation of military service
• DD Form 214 showing 1 year active duty and an honorable discharge OR
• Military orders OR
• Disability discharge documentation
• Documentation of high school completion (final high school transcript or General Educational Development certificate)

Military Service Credits are irrevocable once awarded. Potential consequences should be identified and understood before a request is submitted. Students must consult their academic advisor for advice on the number of credits from military service that can be used in their degree program to avoid excessive credit accumulation and possible negative effects.

Extension and Correspondence Courses

Students may apply a maximum total of 30 semester hours of approved extension class work and correspondence study toward a degree. Students may apply up to 12 hours of correspondence credit earned through an accredited institution toward the requirements for an undergraduate degree, even though Texas A&M does not offer courses by correspondence.

Correspondence courses taken through the Defense Activity for Nontraditional Education Support (DANTES) may be accepted and included in the 12 hours allowed.

In order for a student in residence at Texas A&M to receive credit for correspondence work toward a bachelor’s degree, he or she should:

• obtain advance written permission from the dean of his or her college;
• present appropriate evidence of having completed the course.

Data and Research Services is authorized to act as an agent to receive correspondence courses.
International Admission Criteria

Transcripts/Examination Results
Official academic records (transcripts, marksheets, etc.) are required for all secondary and any university coursework completed. Records should include all courses taken in high school and every college or university the applicant has attended.

Official records require the original seal or original signature of the Registrar, Principal, Headmaster or Director of Student Records. Official records should be mailed from the school directly to Texas A&M University, Office of Admissions. Examination results should be sent directly from the examination agency. In addition to the original records in a language other than English, Texas A&M requires official translations in English. Translations sent directly from the institution attended or from a recognized translator will be accepted. Transcript evaluations that are performed by an evaluation service will not be accepted. For students enrolled in the United States, we will accept copies of official transcripts from other countries that are on file and verified by the U.S. institution. Unofficial photocopies, fax copies and notarized copies of records, examination results or translations will not be accepted.

Admission Criteria for International Applicants with U.S. Based Credentials
International applicants who are completing their education at an institution that is accredited by the U.S. will be reviewed in accordance with the guidelines determined for domestic admission. However, these applicants must still meet international deadlines and testing requirements. (See item 2 below.)

Admission Criteria for International Applicants with Foreign Credentials
International applicants who are completing their education at an institution that is not accredited by the U.S. will be reviewed based on the following criteria:

1. Academic Achievement
   • International applicants are expected to complete an educational program that will allow them to be considered for admission to a university in their home country. Examples include the completion of Grade 13, Form 6 or 3 A-level exams following the General Certificate of Secondary Education (GCSE). Predicted A-level exam results must be received by the application closing date.
   • Successful applicants will rank near the top of their country’s educational system (B average or better) and score well above average on national exams.
   • Secondary school courses: Appropriate college preparatory coursework is required.

2. Testing
   SAT or ACT scores (with writing component) will be considered in the review criteria for international freshman applicants. Additional English testing may be required after admission and before enrollment. Applicants whose native language is not English are required to demonstrate English proficiency by meeting any one of the following requirements:
   • TOEFL scores of 550 paper-based test or 80 internet-based test
   • IELTS with a 6.0 overall band score
   • SAT Critical Reading score of 500 or higher
   • ACT English score of 21 or higher
   • Completed all four years of high school within the U.S.

3. Individual Achievement and Recognition
   • Leadership positions held
   • Honors/awards received
   • Major national, state or Texas A&M scholarships received

Additional Requirements for International Applicants After Admission
If admitted, international applicants must fulfill the following additional requirements before enrollment:

1. International Student Services Channel
   Visit Howdy and click on the Applicant tab. Go to the International Student Services Channel, and click on New Students. At the new international student homepage, follow the instructions. For more information, please visit the International Student Services website.

2. English Verification/Certification
   Texas A&M requires international undergraduate students to demonstrate the ability to speak, write and understand the English language. Undergraduate students may meet this requirement in one of five ways:
   a. official TOEFL score of 600 paper-based test or 100 internet-based test;
   b. official IELTS score of 7.0 overall band;
   c. have an official SAT critical reading score of 500, or ACT English score of 21;
   d. transfer from an accredited U.S. institution of higher education with at least 30 semester credit hours including the equivalent to Texas A&M’s ENGL 103 or ENGL 104 with a grade of “C” or better; or
   e. achieve English Language Proficiency Verification by taking the English Language Proficiency Examination (ELPE) prior to registration for the first semester at Texas A&M University. If remedial English classes are necessary, it will extend the time required to complete a degree.

Scholarship Information for International Students
There are a limited number of scholarships, fellowships, grants and loans available to international students, both in the admission process and throughout their enrollment. Some of these come from academic departments, particularly for graduate applicants, but there are also forms of financial aid available through International Student Services and Scholarships & Financial Aid. International applicants with financial need are encouraged to complete the International Student Financial Aid Application (ISFAA) (http://financialaid.tamu.edu/Forms-%281%29.aspx). This form must be resubmitted annually for continued consideration.

One special opportunity that a student may be eligible for upon admission to Texas A&M University is the Texas/Mexico Education Scholarship. Texas law allows a limited number of admitted applicants who are citizens of Mexico, and who can document financial need, to pay the same tuition as the residents of the State of Texas. For more information regarding how to apply for this scholarship, please refer to International Student Services (http://iss.tamu.edu) website.

For additional information regarding financial assistance and other scholarships available to International Students, please contact:
**Admission Criteria for Other Application Types**

**Readmission Criteria**

Admission decisions for readmission are based on the following:

- GPA on Texas A&M coursework;
- GPA on coursework since leaving Texas A&M;
- desired major; and
- information presented in the application and essay/statement of purpose if provided.

If you were previously admitted but did not attend class through the official census date, you do not qualify as a readmit, and you must apply as either a freshman or transfer student.

If you were previously enrolled at Texas A&M but did not attend class through the official census date of the previous long semester, then you must apply for readmission.

Transcripts from institutions attended since the last enrollment at Texas A&M are required as follows:

<table>
<thead>
<tr>
<th>If Desired Readmission Term Is</th>
<th>Must Have Transcripts Through</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 Spring semester</td>
<td>2015 Summer session</td>
</tr>
<tr>
<td>2016 Summer semester</td>
<td>2015 Fall semester</td>
</tr>
<tr>
<td>2016 Fall semester</td>
<td>2016 Spring semester if applying after June 1</td>
</tr>
</tbody>
</table>

**Postbaccalaureate Undergraduate Criteria**

Admission is limited and is intended for applicants with a degree who wish to apply for further study at the undergraduate level to pursue a second bachelor’s degree.

Additional requirements to complete a postbaccalaureate application:

- official transcripts from all colleges attended (official high school transcript not required)

Admission decisions for postbaccalaureate undergraduates consider:

- GPA on transferable college coursework
- completion of prerequisite coursework
- information presented in the application

Priority is given to qualified applicants for their initial degree; therefore, postbaccalaureate undergraduate admission may be limited or may not be available. See the Classification section of this catalog for the enrollment rights and privileges of this classification.

**Undergraduate Non-degree Criteria**

Admission is limited and is intended for applicants with a high school diploma (with the exception of High School Enrichment Program participants) or for degree applicants who do not intend to pursue a baccalaureate degree at Texas A&M. This includes:

- local residents or University employees taking courses on a part-time basis
- applicants completing established Texas A&M University requirements for teacher or other certification
- applicants completing a prescribed set of courses as preparation for application to graduate study or professional programs (i.e., medical school, veterinary school, law school or CPA exam)
- others as deemed appropriate by the Office of Admissions and the college or program of admission

Additional requirements to complete an undergraduate non-degree application:

- a statement explaining why enrollment at Texas A&M is desired
- an official college transcript showing the latest collegiate coursework attempted or a complete, official high school transcript if no college work has been attempted after high school graduation
- additional information presented in the application may be considered

Priority is given to qualified applicants for their initial bachelor’s degree; therefore, non-degree admission may be limited or not available. The College of Liberal Arts limits enrollment to summer only and the College of Veterinary Medicine does not allow non-degree seeking admission. See the Classification section of this catalog for the enrollment rights and privileges of this classification.

**Transient Session Only Criteria**

Admission is considered for applicants who wish to attend one specific session only and who present appropriate credentials for the level of specified coursework and apply within the processing period for the specific session.

Additional requirements to complete transient session only application:

- a statement explaining why enrollment at Texas A&M is desired
- an official college transcript showing the latest collegiate coursework attempted or a complete, official high school transcript if no college work has been attempted after high school graduation

**High School Enrichment Program**

Texas A&M University is pleased to offer the High School Enrichment Program (HSEP) for qualified high school students in the Bryan/College
Station area that will provide college credit and may also provide credit toward high school graduation. Admission for this program is on a space-available basis. The applicant pool is competitive, and admission into this program is not guaranteed.

This program provides a chance to further your knowledge in a subject you have completed in high school and earn valuable credit for graduation at both levels. For example, if you are interested in Physics and you have completed all of the classes your high school offers, you may qualify to continue to study Physics at the college level.

To be considered for this program, students must have completed all levels of related coursework offered at their high school. Each student is eligible to take 1 (one) course per fall or spring semester, and course registration will be completed by the Texas A&M advisor. No summer classes are offered at this time. Classes will be held on the Texas A&M campus, and students and their parents/guardians will be responsible for any lodging or transportation considerations.

Eligibility requirements:

- You must have a minimum combined Verbal and Math SAT score of 1200 (plus a writing component score), or an ACT score of 27 (plus a writing component score).

**Academic Fresh Start Policy**

Applicants for admission or readmission to Texas A&M may choose to have academic coursework that was completed at least 10 years prior to their term of application removed from consideration in the admission decision (Texas residents only). All other admission requirements apply. Should a Fresh Start applicant be admitted, he or she will forfeit all credit earned prior to 10 years from the term of admission.

Admitted Fresh Start applicants have “Academic Fresh Start” indicated on their official Texas A&M transcript, are required to satisfy TSI/ THEA requirements, and will follow the academic requirements of the Undergraduate Catalog of record for the term of admission.

Forfeited coursework cannot be considered as prerequisites, but placement examinations are allowed for courses which were not considered for admission because of the Fresh Start Policy. Once admitted on Academic Fresh Start, the applicant or student cannot subsequently request that the Fresh Start policy restrictions be removed.

If an applicant has used the Academic Fresh Start Policy at a previous school, the Academic Fresh Start will remain in effect at Texas A&M upon transfer.

**Entry to a Major – Dwight Look College of Engineering**

Freshmen who meet the University and college entrance requirements are admitted into the Dwight Look College of Engineering with a preference to a major field of study and receive a designation of “ENCE”. Students can apply to a major degree granting program after completing at least one semester and after learning about the different engineering disciplines from professional engineers. Before applying for entry to a major, students must complete a minimum of three courses that are applicable to their intended major degree program. The three courses are defined as follows: one engineering course, one math course, and one science course that are in the intended degree plan. The application process is competitive.

Students must be accepted in a major by the end of their fourth semester or they will be blocked from further registration in the Dwight Look College of Engineering.

As an aid to making a decision, the freshman courses ENGR 111 and ENGR 112, Foundations of Engineering, introduce students to engineering problems from the various disciplines. In addition, students may attend departmental presentations, career fairs and other activities sponsored by student engineering professional societies. Academic Advisors at New Student Conferences will help students select courses to fit their preferences and abilities.

Transfer students will be admitted directly to a major degree granting program through the admissions process. Admissions decisions are made by the major degree granting programs after freshman entry-to-a-major decisions are made.

**Upper-Level Entry into Colleges of Architecture, Business and Veterinary Medicine and Biomedical Sciences–Biomedical Science**

**College of Architecture**

**Transfer Students**

Transfer students, who meet the University entrance requirements and who desire to enter a major field of study in the College of Architecture, will be admitted based on available space and current College of Architecture entrance criteria. Following admission, all transfer students are placed on a 2.5 GPR probation for a minimum of 12 credit hours to substantiate competency in required lower-level courses. Transfer students will be admitted into the college with a lower-level classification and may apply for upper-level status after at least one semester at Texas A&M University.

**Change of Major**

Students currently enrolled in another major at Texas A&M University with fewer than 60 hours who desire to change their major field of study into the College of Architecture must fill out a Change of Curriculum application. Deadlines for applications are as follows:

- March 1 for summer admittance (for Construction Science, Environmental Design Architectural Studies, Landscape Architecture, Urban and Regional Planning and Visualization students)
- June 15 for fall admittance (for Construction Science, Environmental Design Architectural Studies, Landscape Architecture, Urban and Regional Planning and Visualization students)
- October 1 for spring admittance (for Construction Science, Landscape Architecture, Urban and Regional Planning and Visualization students)

Students will be notified of action on their applications within 30 days of the deadline date. The college will admit the best-qualified applicants based on the number of spaces available in their program of choice.

**Mays Business School**

Students who meet the University and college entrance requirements enter Mays Business School in the BUAD (lower-level business) classification. Enrollment of Mays Business School students in junior- and senior-level business courses is limited to those who have been admitted to upper level (also referred to as upper division) in one of the seven majors (B.B.A.: accounting, business honors, finance,
management, management information systems, marketing, and supply chain management) in the college.

The B.B.A. (accounting, business honors, finance, management, management information systems, marketing and supply chain management) upper-level entry requirements and application procedures are as follows:

1. To be admitted to an upper-level major, a student must be admitted to Mays Business School and must have:
   a. Satisfactorily completed the following five courses:
      - ACCT 229 Introductory Accounting 3
      - ECON 202 Principles of Economics 3
      - ECON 203 Principles of Economics 3
      - MATH 141 Business Mathematics I 3
      - MATH 142 Business Mathematics II 3
   b. BUAD students apply for upper level before the last class day of the semester before they expect to enter upper level. To enter upper level in the summer, all requirements must be completed by the beginning of the first summer session.
   c. Unless satisfactorily completed prior to Upper-level entry business students must successfully complete these three remaining Lower-level Common Body of Knowledge (CBK) courses at Texas A&M during their first upper-level semester:
      - ACCT 230 Introductory Accounting 3
      - ISYS 210 Fundamentals of Information Systems 3
      - MGMT 211 Legal and Social Environment of Business 3
   d. Students are encouraged to complete the freshman and sophomore sequence of courses as listed under Curriculum in Business. BUAD students may pre-register for upper-level business courses in the semester for which they have applied for upper level. However, BUAD students who fail to meet upper-level requirements prior to the start of the semester shall not be permitted to remain registered in upper-level business classes.

2. Transfer students:
   Transfer students admitted to Mays Business School will be classified as BUAD (lower-level Business) students until they complete all requirements listed previously in item 1, at which time they may apply for admission to an upper-level major field of study in the business school. Transfer students may immediately apply for upper level when admitted to Mays Business School if, and only if, they meet all upper-level requirements at that time.

3. Change of curriculum students:
   Texas A&M students who change curriculum into Mays Business School from another college or department at the University will be classified as BUAD (lower-level Business) students until they complete all requirements listed previously in item 1. Change of curriculum students who, when admitted to the business school, qualify to apply for admission to the upper level may do so.

4. Preference for available seats in junior- and senior-level business courses will be given to students who have been admitted to a degree granting major in Mays Business School. All ineligible students who pre-register for upper-level business classes are subject to cancellation of their enrollment in these courses.

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### College of Veterinary Medicine and Biomedical Sciences—Biomedical Sciences

1. A Biomedical Sciences (BIMS) major will be admitted into the upper-level courses according to the following criteria:
   a. Completion of a set of Common Body of Knowledge (CBK) courses with a grade of C or better in each course completed at Texas A&M. Normally, for admission to BIMS upper-level courses, a student may have attempted a CBK course no more than twice.
   b. Common Body of Knowledge (CBK) courses
      - BIOL 111 Introduction to Biology I 4
      - BIOL 112 Introduction to Biology II 4
      - CHEM 101 Fundamentals of Chemistry I 4
      - CHEM 102 Fundamentals of Chemistry II 4
      - CHEM 111 Fundamentals of Chemistry Laboratory I 4
      - CHEM 112 Fundamentals of Chemistry Laboratory II 4
      - CHEM 227 Organic Chemistry I 4
      - CHEM 228 Organic Chemistry II 4
      - PHYS 201 College Physics 4
      - PHYS 202 College Physics 4
      - MATH 131 Mathematical Concepts—Calculus 3

   **Total Semester Credit Hours** 35

   b. A minimum of 55 completed semester hours with a cumulative resident Grade Point Ratio (GPR) of 2.5 or better.
   c. Process: Each student upon completing 55–65 semester credit hours must have a degree audit to verify upper-level eligibility.

2. The Biomedical Sciences Program will continue to accept changes of major into BIMS according to current Texas A&M University policy, but restrict changes of major into the upper-level courses (BIMS) according to the criteria listed in item 1. Students in other majors requesting a change of major to the BIMS program must also fulfill the criteria in item 1. In addition, the dean must verify availability of resources necessary to insure the student’s full-time enrollment in required upper-level courses prior to admission to upper-level status. If such courses are not available, the student will be denied admission to Biomedical Sciences.

3. To enter BIMS upper-level courses, transfer students must have:
   a. A minimum GPR of 3.0 in CBK courses with a grade of B or better in each completed course if taken at a 2-year college. A grade of C or better is accepted from a 4-year college.
   b. Transfer students admitted under another major and wishing to change into BIMS must complete one semester of graded coursework at Texas A&M University with a cumulative resident GPR of 2.5.
   c. Texas A&M University change of majors must have at least 55 semester credit hours with a minimum cumulative GPR of 2.5.

4. Students seeking readmission will be considered on a case-by-case basis, according to current catalog policy. No quotas will be placed on readmission; however, the decision to readmit will be dependent on resource availability and University policy.
5. Any BIMS student admitted to upper-level courses who then falls below the 2.5 GPR requirement will not be considered in good academic standing in their major and will be placed on college probation. All Biomedical Sciences majors must follow established probation rules for the Biomedical Sciences Program.

6. The Dean, Director or Department Head will reserve the right to waive CBK or GPR requirements within the criteria established in Texas A&M University Student Rules.

7. No courses other than BIMS 481, BIMS 484, VIBS 310, VIBS 311, or research/directed studies courses can be taken S/U to be used in the degree plan.

8. BIMS probation is determined at the end of the Spring semester. Students not meeting acceptable GPR requirements (2.5 BIMS majors with 55 or more hours or 2.0 area of concentration (USVM) or BIMS majors with less than 55 hours) will be required to attend Texas A&M University that summer and repeat courses as needed to raise their GPR.

9. Students may only attempt CVM courses a total of three times.

**Course Credit**

**Data and Research Services**

Data and Research Services has primary responsibility for conducting research about students’ learning and development at Texas A&M and for management of testing programs. The unit serves as the center for credit by examination, placement testing and correspondence testing, as well as national standardized testing. Other services include publication of research reports about student characteristics and abilities, test validation studies and evaluation studies, scanning and scoring services, and student ratings of faculty.

**Credit by Examination**

Undergraduate students at Texas A&M may earn course credits by demonstrating superior achievement on tests offered through several examination programs. Credit by examination is available to freshmen who plan to enter the University and to students who are currently enrolled. Credit earned by examination does not contribute to a student’s grade point ratio. The University awards credit for scores on certain tests published by the Advanced Placement Program (AP), the College Level Examination Program Computer-Based Testing (CLEP CBT), the SAT Subject Tests, DANTES Subject Standardized Tests (DSST) and the International Baccalaureate (IB) Program. Texas A&M also offers qualified students opportunities to earn credits by taking departmental examinations prepared by the faculty. Information concerning credit by examination may be obtained from Data and Research Services (http://dars.tamu.edu), (979) 845-0532.

Please note these regulations concerning credit by examination:

1. Test scores and/or credit eligibility must be reported formally to Data and Research Services for credit by examination to be awarded. Credit is posted to the academic record on or hardship forms are received by Data and Research Services, the student has officially enrolled in the University and the student has accepted the credit. For information regarding current procedures for accepting credit, please visit the Data and Research Services (http://dars.tamu.edu) website.

2. Students may not receive credit by examination for courses that are prerequisites to courses for which they already have credit except with the approval of the department authorizing the examination.

3. A student may not have credit posted for credit by examination for a course in which he or she is currently registered. If a student has acquired a grade or exercised First-Year Grade Exclusion on a course, then the student will not be eligible to take the equivalent departmental exam. Eligibility will not be affected if a student has a Q, W or NG in a course.

**Advanced Placement Program (AP)**

Examinations offered by the AP Program are administered during late spring by high schools. Students usually take the examinations after completing Advanced Placement courses, although experience in an AP course is not required. Interested students should contact their high school counselors for information concerning registration and test sites. High school students must currently enrolled students should have the College Board forward their scores to Data and Research Services, institution code: 6003. Advanced Placement scores of entering freshmen are generally received in July. Students will need to log onto their Howdy portal under My Records and then Credit by Exam to accept the credit earned via AP tests. Data and Research Services suggests visiting with your advisor before you accept credit.

The following list includes all AP examinations currently accepted for credit.

<table>
<thead>
<tr>
<th>AP Examination</th>
<th>Minimum Score Required</th>
<th>Texas A&amp;M Course(s)</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art History</td>
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<td>ARTS 149, ARTS 150</td>
<td></td>
</tr>
<tr>
<td>Biology</td>
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<td>BIOL 111, BIOL 112</td>
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<tr>
<td>Calculus AB</td>
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<td>MATH 151</td>
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<tr>
<td>Calculus BC</td>
<td>3</td>
<td>MATH 151</td>
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<td>MATH 151, MATH 152</td>
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<td>Chemistry</td>
<td>3</td>
<td>CHEM 101, CHEM 111</td>
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<td>4</td>
<td>CHEM 101, CHEM 102, CHEM 111, CHEM 112</td>
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<td>Chinese</td>
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<td>CHIN 101, CHIN 102</td>
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<td></td>
<td>4</td>
<td>CHIN 101, CHIN 102, CHIN 201, CHIN 202</td>
<td>8</td>
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<tr>
<td>Comparative Governments</td>
<td>4</td>
<td>POLS 229</td>
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<tr>
<td>Computer Science A</td>
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<td>CSCE 110</td>
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<tr>
<td>Computer Science AB</td>
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<td>CSCE 110</td>
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<tr>
<td>Economics: Macroeconomics</td>
<td>4</td>
<td>ECON 203</td>
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<td>Economics: Microeconomics</td>
<td>4</td>
<td>ECON 202</td>
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<tr>
<td>English Lang. and 3 Comp.</td>
<td>4</td>
<td>ENGL 104</td>
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<td>Course</td>
<td>Credits</td>
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<td>English Lit. and Comp.</td>
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<td>European History</td>
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<td>GEOG 201</td>
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<td>Italian Language</td>
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<tr>
<td>ITAL 101, ITAL 102</td>
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<td>Japanese Language</td>
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<td>JAPN 101, JAPN 102</td>
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<td>Latin: Literature</td>
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<td>CLAS 121, CLAS 122</td>
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<td>Music Theory</td>
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<td>PHYS 202</td>
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<td>Physics C: Mechanics</td>
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<td>PHYS 201 or PHYS 208</td>
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<td>Physics C: Elect. and Magnetism</td>
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<td>SPAN 202</td>
<td></td>
<td>3</td>
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<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Statistics</td>
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<tr>
<td>STAT 301, STAT 302 or STAT 303</td>
<td></td>
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<tr>
<td>Studio Art: Drawing</td>
<td>4</td>
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</tr>
<tr>
<td>ARTS 103, ARTS 111</td>
<td></td>
<td>111</td>
</tr>
<tr>
<td>Studio Art: 2-D</td>
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</tr>
<tr>
<td>ARTS 103, ARTS 111</td>
<td></td>
<td>111</td>
</tr>
<tr>
<td>U.S. Government and Politics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>POLS 206</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>U.S. History</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>HIST 105, HIST 106</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Visual Arts</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>ARTS 103</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>World History</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>HIST 104</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

1 Credit in MATH 151 may be substituted for MATH 131, MATH 142 or MATH 171. Credit in MATH 152 may be substituted for credit in MATH 172.

2 Credit in physics is based on the curriculum of a student’s intended major.

For instructions on accepting AP credit, please visit http://dars.tamu.edu.

### College Level Examination Program Computer-Based Testing (CLEP CBT)

CLEP CBT tests are designed to evaluate nontraditional college-level education such as independent study, correspondence work, etc. Both enrolled undergraduate students and entering freshmen may receive CLEP CBT credit for the courses which are listed below. Only examination titles below are currently accepted. The minimum scores listed below are based on the current version of CLEP CBT Examinations. Students will need to log onto their Howdy portal under My Records and then Credit by Exam to accept the credit earned via CLEP tests. Data and Research Services suggests visiting with your advisor before you accept credit.

<table>
<thead>
<tr>
<th>CLEP CBT Subject Examination</th>
<th>Minimum Score Required</th>
<th>Texas A&amp;M Course(s)</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algebra</td>
<td>50</td>
<td>MATH 102</td>
<td>3</td>
</tr>
<tr>
<td>American Government</td>
<td>50</td>
<td>POLS 206</td>
<td>3</td>
</tr>
<tr>
<td>Calculus with Elementary Functions</td>
<td>50</td>
<td>MATH 151 or MATH 171</td>
<td>4</td>
</tr>
<tr>
<td>Chemistry</td>
<td>45</td>
<td>CHEM 101/111</td>
<td>4</td>
</tr>
<tr>
<td>Physics 1</td>
<td>45</td>
<td>PHYS 201 or PHYS 218</td>
<td>4</td>
</tr>
<tr>
<td>Physics 2</td>
<td>50</td>
<td>CHEM 101/111</td>
<td>8</td>
</tr>
<tr>
<td>Physics C: Mechanics</td>
<td>50</td>
<td>CHEM 101/111/102</td>
<td>8</td>
</tr>
<tr>
<td>Psychology</td>
<td>35</td>
<td>PSYC 107</td>
<td>3</td>
</tr>
<tr>
<td>Spanish Language</td>
<td>55</td>
<td>SPAN 101, SPAN 102</td>
<td>4</td>
</tr>
<tr>
<td>Spanish Literature</td>
<td>45</td>
<td>SPAN 101, SPAN 102</td>
<td>5</td>
</tr>
<tr>
<td>Spanish Language</td>
<td>55</td>
<td>SPAN 101, SPAN 102</td>
<td>5</td>
</tr>
<tr>
<td>Financial Accounting</td>
<td>50</td>
<td>ACCT 209</td>
<td>3</td>
</tr>
<tr>
<td>History of the United States I: Early Colonization to 1877</td>
<td>60</td>
<td>HIST 105</td>
<td>3</td>
</tr>
</tbody>
</table>
History of the United States II: 1865 to the Present

Human Growth and Development
Macroeconomics
Microeconomics
Pre-Calculus
Psychology, Introductory
Sociology, Introductory
Western Civilization I: Ancient Near East to 1648
Western Civilization II: 1648 to Present

For instructions on accepting CLEP credit, please visit http://dars.tamu.edu.

Dantes Subject Standardized Tests (DSST) Program
The DSST Program is available to all interested persons. Enrolled undergraduate students and entering freshmen may receive DSST credit for the courses listed below. For more information about the test, please contact Data and Research Services.

<table>
<thead>
<tr>
<th>DSST Examination</th>
<th>Minimum Score Required</th>
<th>Texas A&amp;M Course(s)</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art of the Western World</td>
<td>50</td>
<td>ARTS 149, ARTS 150</td>
<td>6</td>
</tr>
<tr>
<td>Astronomy</td>
<td>48</td>
<td>ASTR 101</td>
<td>3</td>
</tr>
<tr>
<td>Business Law II</td>
<td>52</td>
<td>MGMT 212</td>
<td>3</td>
</tr>
<tr>
<td>Lifespan Develop.</td>
<td>47</td>
<td>PSYC 307</td>
<td>3</td>
</tr>
<tr>
<td>Principles of Statistics</td>
<td>48</td>
<td>STAT 201 or PSYC 203</td>
<td>3, 4</td>
</tr>
</tbody>
</table>

International Baccalaureate (IB)
Texas A&M University, in compliance with SB111, will grant at least 24 semester credit hours of course-specific college credit in subject-appropriate areas on all International Baccalaureate (IB) exam scores of 4 or above as long as the incoming freshman has earned an IB diploma. While some course credit will be awarded regardless of a student’s IB diploma status, some course credit at Texas A&M University may be subject to the successful completion of the IB diploma.

Entering freshman students should submit their International Baccalaureate transcript to Texas A&M University, institution code: 01355, for review. Students should contact Data and Research Services regarding their eligibility for course credit. Students should work with an academic advisor to determine the use of the IB credits in their individual degree plan and the impact accepting the credit may have upon tuition rebate eligibility, tuition charges for excessive total hours, and preparedness for sequential coursework based on IB test scores. Students will need to log onto their Howdy portal under My Records and then Credit by Exam to accept the credit earned via IB tests. Data and Research Services suggests visiting with your advisor before you accept credit.

Texas A&M University will notify IB applicants of their eligibility to receive credit by posting information on the website, Data and Research Services, and by establishing links to other web pages.

The evaluation of IB courses in order to identify the appropriate course credit is continuing and will be posted as it becomes available. The following list includes all IB examinations currently accepted for credit.

<table>
<thead>
<tr>
<th>IB Higher Level Examination</th>
<th>Minimum Score Required</th>
<th>Texas A&amp;M Course(s)</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arabic: Language A or B SL</td>
<td>4</td>
<td>ARAB 101</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>ARAB 101, ARAB 8 102</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>ARAB 101, ARAB 11 102, ARAB 201</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>ARAB 101, ARAB 14 102, ARAB 201, ARAB 202</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arabic: Language A or B HL</td>
<td>4</td>
<td>ARAB 101</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>ARAB 101, ARAB 8 102</td>
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<td></td>
</tr>
<tr>
<td>6</td>
<td>ARAB 101, ARAB 11 102, ARAB 201</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>ARAB 101, ARAB 14 102, ARAB 201, ARAB 202</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biology SL</td>
<td>4 w/diploma</td>
<td>BIOL 113/BIOL 123</td>
<td>4</td>
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<tr>
<td>5</td>
<td>BIOL 111, BIOL 112</td>
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<tr>
<td>6</td>
<td>BIOL 111, BIOL 112</td>
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<td>7</td>
<td>BIOL 111, BIOL 112</td>
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<td></td>
</tr>
<tr>
<td>Business Management SL</td>
<td>4 w/diploma</td>
<td>MGMT 309</td>
<td>3</td>
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<tr>
<td>5</td>
<td>MGMT 309</td>
<td></td>
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<tr>
<td>Business Management HL</td>
<td>4 w/diploma</td>
<td>MGMT 309</td>
<td>3</td>
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<tr>
<td>5</td>
<td>MGMT 309</td>
<td></td>
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<tr>
<td>Chemistry SL</td>
<td>4 w/diploma</td>
<td>CHEM 106/116</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>CHEM 101/111</td>
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<tr>
<td>7</td>
<td>CHEM 101/111</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chinese: Language A or B SL</td>
<td>4</td>
<td>CHIN 101</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>CHIN 101, CHIN 102</td>
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<td>7</td>
<td>CHIN 101, CHIN 102, CHIN 201, CHIN 202</td>
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<tr>
<td>Subject</td>
<td>Language</td>
<td>Level</td>
<td>Course Code</td>
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<tr>
<td><strong>Chinese:</strong></td>
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<td>A or B</td>
<td>CHIN 101</td>
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<tr>
<td></td>
<td>HL</td>
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<td>CHIN 101, CHIN 102</td>
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<td></td>
<td></td>
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<td>CHIN 101, CHIN 102, CHIN 201</td>
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<tr>
<td><strong>Classical Greek:</strong></td>
<td>SL</td>
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<td>CLAS 101</td>
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<td>CLAS 101, CLAS 102</td>
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<td>CLAS 101, CLAS 102, CLAS 211</td>
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<td>HL</td>
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<td>CLAS 101</td>
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<td>CLAS 101, CLAS 102</td>
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<td></td>
<td>CLAS 101, CLAS 102, CLAS 211</td>
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<tr>
<td><strong>Economics:</strong></td>
<td>SL</td>
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<td>ECON 203</td>
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<tr>
<td><strong>English:</strong></td>
<td>Language</td>
<td>A or B</td>
<td>ENGL 104</td>
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<td>HL</td>
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<td>ENGL 104</td>
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<td>ENGL 104, ENGL 222/MODL 222</td>
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<td><strong>Environmental Systems:</strong></td>
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<td>GEOS 105</td>
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<tr>
<td><strong>French:</strong></td>
<td>Language</td>
<td>A or B</td>
<td>FREN 101</td>
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<td>HL</td>
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<tr>
<td><strong>Fundamentals of Music:</strong></td>
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<td>MUSC 102, MUSC 202</td>
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<tr>
<td><strong>Further Mathematics SL:</strong></td>
<td></td>
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<td>MATH 102</td>
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<td>MATH 150</td>
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<tr>
<td><strong>Geography SL:</strong></td>
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<td>GEOG 201</td>
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<tr>
<td><strong>German: Lang. A or B:</strong></td>
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<td>GERM 101</td>
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<tr>
<td><strong>History:</strong></td>
<td></td>
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<td>HIST 104</td>
</tr>
<tr>
<td><strong>Italian:</strong></td>
<td>Language</td>
<td>A or B</td>
<td>ITAL 101</td>
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<td>HL</td>
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<td>ITAL 101, ITAL 102</td>
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<td>Level</td>
<td>Code</td>
<td>Language/Subject</td>
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<td>ITAL 101, ITAL 102</td>
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<td>ITAL 101, ITAL 102</td>
<td>11</td>
<td>ITAL 101, ITAL 102</td>
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<td>ITAL 101, ITAL 102</td>
<td>14</td>
<td>ITAL 101, ITAL 102</td>
<td>General Information</td>
</tr>
<tr>
<td>Japanese: Lang. A or B SL</td>
<td>4</td>
<td>JAPN 101</td>
<td>General Information</td>
</tr>
<tr>
<td>Japanese: Lang. A or B HL</td>
<td>4</td>
<td>JAPN 101</td>
<td>General Information</td>
</tr>
<tr>
<td>Latin SL</td>
<td>4</td>
<td>CLAS 121</td>
<td>General Information</td>
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<tr>
<td>Latin HL</td>
<td>4</td>
<td>CLAS 121</td>
<td>General Information</td>
</tr>
<tr>
<td>Mathematics SL</td>
<td>4</td>
<td>MATH 150</td>
<td>General Information</td>
</tr>
<tr>
<td>Mathematics HL</td>
<td>4</td>
<td>MATH 150</td>
<td>General Information</td>
</tr>
<tr>
<td>Mathematical Methods SL</td>
<td>4</td>
<td>MATH 150</td>
<td>General Information</td>
</tr>
<tr>
<td>Mathematical Methods SL</td>
<td>5</td>
<td>MATH 150, MATH 151</td>
<td>General Information</td>
</tr>
<tr>
<td>Mathematical Methods SL</td>
<td>5</td>
<td>MATH 150</td>
<td>General Information</td>
</tr>
<tr>
<td>Mathematical Methods SL</td>
<td>5</td>
<td>MATH 150</td>
<td>General Information</td>
</tr>
<tr>
<td>Music SL</td>
<td>4</td>
<td>MUSI 201</td>
<td>General Information</td>
</tr>
<tr>
<td>Music HL</td>
<td>4</td>
<td>MUSI 201</td>
<td>General Information</td>
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</table>
Spanish: Lang. A 3
or B HL

<table>
<thead>
<tr>
<th>Credit</th>
<th>Course(s)</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>SPAN 101, SPAN 8 102</td>
<td></td>
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<tr>
<td>5</td>
<td>SPAN 101, SPAN 11 102, SPAN 201</td>
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</tr>
<tr>
<td>6/7</td>
<td>SPAN 101, SPAN 14 102, SPAN 201, SPAN 202</td>
<td></td>
</tr>
</tbody>
</table>

Theater Arts SL 4 w/diploma
Theater Arts HL 4
Visual Arts SL 4 w/diploma
Visual Arts HL 4

1 Credit for MATH 151 may be substituted for MATH 131, MATH 142 or MATH 171.

For instructions on accepting IB credit, please visit http://dars.tamu.edu.

**SAT Subject Tests**

Credits are offered to entering freshmen who score high on the SAT Subject Tests. High school students who are interested in taking these tests should contact their school counselors or write College Board ATP, Box 592, Princeton, NJ 08541.

**Subject Test** | **Minimum Score Required** | **Texas A&M Course(s)** | **Credit Hours** |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry</td>
<td>630</td>
<td>CHEM 101/ CHEM 111</td>
<td>4</td>
</tr>
<tr>
<td>French</td>
<td>640</td>
<td>FREN 101</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>740</td>
<td>FREN 101, FREN 102</td>
<td>8</td>
</tr>
<tr>
<td>German</td>
<td>630</td>
<td>GERM 101</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>740</td>
<td>GERM 101, GERM 102</td>
<td>8</td>
</tr>
<tr>
<td>Italian</td>
<td>630</td>
<td>ITAL 101</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>750</td>
<td>ITAL 101, ITAL 102</td>
<td>8</td>
</tr>
<tr>
<td>Latin</td>
<td>630</td>
<td>CLAS 121</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>730</td>
<td>CLAS 121, CLAS 122</td>
<td>8</td>
</tr>
<tr>
<td>Physics</td>
<td>680</td>
<td>PHYS 201, PHYS 202</td>
<td>4</td>
</tr>
<tr>
<td>Spanish</td>
<td>630</td>
<td>SPAN 101</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>750</td>
<td>SPAN 101, SPAN 8 102</td>
<td>8</td>
</tr>
</tbody>
</table>

The minimum score required is based on the recentered scale. Students who took tests before April 1, 1995, should contact Data and Research Services to determine the minimum score required. For instructions on accepting SAT Subject credit, please visit http://dars.tamu.edu.

**Departmental Examinations for Entering Freshmen and Currently Enrolled Students**

Qualified entering freshmen may take departmental tests after being officially admitted into Texas A&M University. Currently enrolled students can also take the exams throughout the year. Contact Data and Research Services (http://dars.tamu.edu) for registration information. The tests are prepared by participating Texas A&M departments. Current offerings include:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
<td>6</td>
</tr>
<tr>
<td>&amp; CHEM 102</td>
<td>and Fundamentals of Chemistry II</td>
<td></td>
</tr>
<tr>
<td>CSCE 110</td>
<td>Programming I</td>
<td>4</td>
</tr>
<tr>
<td>ISYS 209</td>
<td>Business Information Systems Concepts</td>
<td>3</td>
</tr>
<tr>
<td>MATH 102</td>
<td>Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 131</td>
<td>Mathematical Concepts—Calculus</td>
<td>3</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Business Mathematics I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 142</td>
<td>Business Mathematics II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 152</td>
<td>Engineering Mathematics II</td>
<td>4</td>
</tr>
<tr>
<td>MATH 166</td>
<td>Topics in Contemporary Mathematics II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 171</td>
<td>Analytic Geometry and Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MATH 172</td>
<td>Calculus</td>
<td>4</td>
</tr>
<tr>
<td>MATH 251</td>
<td>Engineering Mathematics III (Available to entering freshman only during the summer before beginning classes at Texas A&amp;M)</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 201</td>
<td>College Physics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 202</td>
<td>College Physics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 208</td>
<td>Electricity and Optics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 218</td>
<td>Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
</tr>
</tbody>
</table>

Foreign Language (up to four semesters of coursework in French, German, Italian, Japanese, Latin, Russian, Arabic and Mandarin Chinese)

**Texas Success Initiative (TSI)**

The Texas Success Initiative (TSI) was instituted to ensure that students enrolled in Texas public colleges and universities possess the necessary academic skills to perform effectively in college and to provide diagnostic information about reading, writing and mathematics skills of each student. All undergraduate students who did not meet one of the allowed exemptions must take the approved TSI Assessment test.

Students who do not meet established cutoff scores or other approved exemptions for the TSI Assessment test are required by Texas law to be enrolled in, and actively attend, an academic skills course and/or program each semester prior to completing all TSI requirements. Academic skills courses in each of the three TSI areas are offered by Texas A&M. Failure to meet the attendance requirements of the academic skills course will result in withdrawal from Texas A&M. The hours for these courses will not count toward any degree program but may count toward determining full-time status.

Students required to take the TSI Assessment test should have their scores sent by the testing agency to Texas A&M University.

More information can be obtained from testing centers at most Texas public colleges and universities or by contacting:

Texas Higher Education Coordinating Board
P. O. Box 12788
Austin, TX 78711-2788

or
Baylor College of Dentistry (Health Science Center) – Caruth School of Dental Hygiene

Basis For Acceptance

All applicants will be considered using the following criteria. In addition, the applicant must be able to perform the essential functions required in the curriculum. The quality of the applicant’s academic achievement is a prime consideration. A grade point average (GPA) is computed based on all courses taken in college.

Preference for admission is given to students with:

- A cumulative GPA and Science GPA indicating ability to succeed in the program.
- Attention given to detail when completing the application.
- A comprehensive biographical sketch that includes information that will help the Admissions Committee know the applicant better. Details about the dental hygiene procedures that have been observed, a description of the community service projects in which you have participated and information concerning your interests, abilities and attitudes that have motivated you to make the commitment required for a career in dental hygiene are examples of information that might be included.

The application deadline is January 5. The Office of Recruitment and Admissions encourages applicants to submit the online application forms by December 1. All materials related to the application must be received in the Office of Recruitment and Admissions by February 1.

- The following must be included with the application when it is submitted online:
  a. Application for Admission
  b. Secondary Application
  c. List of courses in progress and those planned prior to enrollment in the dental hygiene program
  d. Biographical sketch
- Other materials that should be sent to complete your application:
  a. Application Fee ($35.00)
  b. Photograph sized 2 X 2 (does not have to be a passport picture - can be regular photograph cut down)
  c. Transcripts from high school and all colleges attended (if you attended a foreign high school, you do not have to submit a copy)
  d. Scores from Texas Success Initiative (TSI). (Or if exempt, SAT/ACT or TAAS– usually scores are listed on high school transcript; you do not have to submit scores separately.)
  e. Observation Verification Form (minimum 16 hours required)
  f. Evaluation Forms (submitted by a science instructor, dental hygienist and personal friend)
- An application is valid for one academic year only.
- Official transcripts are required and will be accepted only when sent directly from each school the applicant has attended.

- Recommendations are required from a dentist or a dental hygienist, a biology or chemistry instructor and an individual who has known the applicant for some time; for example, an employer or supervisor.
- It is the responsibility of the applicant to keep the application file current. Failure to supply grades, transcripts or recommendations may be perceived as an indication that the applicant is no longer interested in admission.

Interviews

Processing of applications begins the year prior to entrance into the professional program and continues until the class is filled. The applications are evaluated, and an invitation for an interview may be extended. The purpose of the interview is to determine the applicant’s knowledge of the dental hygiene profession. It also provides an opportunity for the applicant to see the facility, meet with the Admissions Committee and to ask questions about the Caruth School of Dental Hygiene program.

All prospective students are encouraged to contact the college with questions regarding prerequisite courses or the program.

To Access the Dental Hygiene Application Forms:

The applicant will need to create an account on the Banner Admissions Management Framework (BAMF) website. The applicant will be required to complete and submit the Baylor College of Dentistry (BCD) Dental Hygiene Application, the BCD Secondary Application and the Ethnicity Form.

The application for the Dental Hygiene Program will be available on the BAMF website from July 15 to January 5.

Download Forms (Adobe PDF files):

The Evaluation Form and Observation Verification Form are available for download. You will need to print these forms and submit them with signatures through regular mail.

- Evaluation Form – top section to be filled in by applicant
- Observation Verification Form

For questions about the application process, please contact The Office of Recruitment and Admissions at (214) 828-8231 or by email at admissions-bcd@bcd.tamhsc.edu.

Mail forms and transcripts to:

Office of Recruitment and Admissions
Texas A&M Baylor College of Dentistry
3302 Gaston Avenue, Room 525
Dallas, TX 75246-2013
USA

Transfer Credit

Transfer credit will be determined by each component in conjunction with the staff of the college on a course-by-course basis from official transcripts submitted in the competitive admissions process. Course content will be determined by the catalog course description or course syllabus.

Course acceptability is guided by these criteria:

- Courses completed at regionally accredited institutions are considered for transfer if:
  a. They are directly linked to the applicant's dental hygiene program.
  b. They are equivalent to courses offered at Texas A&M College of Dentistry in terms of content and rigor.
  c. They are categorized as essential functions required in the dental hygiene program.
  d. They meet the academic standards and prerequisites set forth by the Texas A&M College of Dentistry.

The applicant will need to create an account on the Banner Admissions Management Framework (BAMF) website. The applicant will be required to complete and submit the Baylor College of Dentistry (BCD) Dental Hygiene Application, the BCD Secondary Application and the Ethnicity Form.

The application for the Dental Hygiene Program will be available on the BAMF website from July 15 to January 5.
a. They are acceptable as credit for a bachelor’s degree at a regionally accredited institution.

b. Course content is at or above the level of courses specified in the BCD requirements for admission.

- Courses intended for use in a vocational, technical or occupational program normally do not transfer; general courses within this type of program may transfer.
- Credit on the transcript must appear in semester hours or credits that may be converted to semester hours.
- Credit by examination courses may be transferred if accepted by another college and followed by sequenced coursework.
- Equivalency of coursework is determined by content found in catalog course descriptions or syllabi of courses. In case of doubt, departmental faculty will determine equivalency. The final determination is left to the director of the Department of Dental Hygiene.
- As a general policy, coursework with a passing grade may be transferred, but the applicant must keep in mind that admission to the hygiene program is on a competitive basis and grades of F are calculated into the grade point average.
- Course hours will be evaluated on a course-by-course basis but will be transferred as a block of hours, and the grades do not calculate into the GPA for the hygiene program.
- Credit will be given for correspondence courses on a select basis.
- Typically, credit will not be given for courses completed at institutions not accredited by a regional accrediting agency.
- The BCD does not accept non-credit coursework to be used in lieu of coursework taken for academic credit.

### Baylor College of Dentistry (Health Science Center)

**Dental Hygiene Program (BS)**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Fee</td>
<td>$35 non-refundable fee</td>
</tr>
<tr>
<td>Admission Standards</td>
<td>Completion of required courses with GPA as high as possible. Admission is competitive.</td>
</tr>
<tr>
<td>Use of High School Record</td>
<td>No</td>
</tr>
<tr>
<td>Number of Articulation Agreements</td>
<td>Not applicable</td>
</tr>
<tr>
<td>TOEFL**</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Other Requirements</td>
<td>Three LOR required and TSI assessment. Interview; comprehensive biographical sketch; and 16 hours of verified observation of a dental hygienist</td>
</tr>
</tbody>
</table>

### College of Nursing (Health Science Center)

There are three different tracks leading to a baccalaureate degree in nursing. The traditional BSN track is for students seeking their first degree in college. The second degree BSN track (post baccalaureate) is for individuals who have already earned a bachelor’s degree in another field of study. The third option is an RN to BSN program for registered nurses who hold an associate degree in nursing. Students admitted to the BSN track with an interest in earning a Master’s Degree-Family Nurse Practitioner may interview to be chosen for the Select BSN/MSN track.

Prerequisite courses, which are the essential foundation for nursing, must be completed before entry into upper-division nursing courses. In addition, all students must meet the core curriculum requirements for Texas A&M University if not already completed at another institution.

The following documents are required for an application to be considered complete and ready for review:

- Apply Texas Application
- Application fee
- Official college transcript(s)
- Completion of prerequisite and core curriculum courses with a grade of C or better
- Personal essay (see website for specific information)
- Admissions Assessment Exam (HESI A2) required for traditional, second degree and select track BSN applicants only
- Reference required for RN to BSN applicants only
- RN to BSN applicants must provide proof of State of Texas RN licensure in good standing
- Copy of permanent resident card, if applicable
- Official TOEFL Scores required for international applicants and must be taken within the past two years. Test scores must be sent directly from the testing agency to be considered official.

### Additional Requirements for International Applicants and Applicants with Foreign Credentials

Applicants with foreign transcripts must also include an official World Education Services (WES) or Educational Credential Evaluations, Inc. (ECE) transcript evaluation report listing course-by-course U.S. grade point equivalencies and semester credits received. Applicants from an institution that does not issue a transcript in English must submit the native language transcript along with an official English translation. These documents must include all original seals and/or signatures.

Applicants whose native language is not English are required to submit proof of English proficiency, which is satisfied by:

- a minimum TOEFL score taken within the previous two years of: 587 for paper-based testing (p-BT), or 240 computer-based testing (c-BT), or 95 Internet-based testing (i-BT), or
- a minimum IELTS score of 6.0 overall band
- completing all four years of high school in a U.S. accredited school, or
- earning a baccalaureate degree following four years of study at a U.S. accredited institution.

The College of Nursing requires an official copy of test scores and/or other documentation in order to verify English proficiency requirements. The test must have been completed within two years of the date of intended enrollment. International applicants will be expected to present declaration of finances, F-1 travel documents and the immigration informational questionnaire upon acceptance to the College of Nursing and meet all deadlines required by the Office of International Student Services.

Applications must be received by the posted deadline. No late documents will be accepted. Admission to the college is competitive. At the time of application, students must be enrolled in or have completed all prerequisite course requirements. Admission offers may be made to students finalizing courses and will be contingent upon successful completion of all prerequisite requirements and students presenting a clear criminal background check.
Students applying to the College of Nursing must complete selected coursework as a condition of acceptance. If the student completed a core curriculum from another Texas public institution in a previous degree program, they are not required to complete the college’s Core Curriculum. Students transferring from out of state, from a private institution, those with an international degree or anyone with concerns about this requirement, please contact the Office of Student Affairs for more clarification. Students will not be considered for admission unless the required coursework will be completed by the time of enrollment.

**Prerequisite Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>6</td>
</tr>
<tr>
<td>American History</td>
<td>6</td>
</tr>
<tr>
<td>Government (Federal and Texas)</td>
<td>6</td>
</tr>
<tr>
<td>Psychology (General and Lifespan Growth and Development)</td>
<td>6</td>
</tr>
<tr>
<td>Intro to Ethics (Culture/Language/Philosophy)</td>
<td>3</td>
</tr>
<tr>
<td>Creative Arts</td>
<td>3</td>
</tr>
<tr>
<td>Math</td>
<td>6</td>
</tr>
<tr>
<td>Nutrition and Diet Therapy</td>
<td>3</td>
</tr>
<tr>
<td>Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>General Biology</td>
<td>4</td>
</tr>
<tr>
<td>Microbiology</td>
<td>4</td>
</tr>
<tr>
<td>Anatomy &amp; Physiology</td>
<td>8</td>
</tr>
</tbody>
</table>

**College of Nursing (Health Science Center) Traditional, Second Degree and RN to BSN**

Application Fee: • $75 Paid through Apply Texas Application

Admission Standards: • Admission is competitive. • Strongly recommended that applicants present a minimum overall grade point average of 3.0 (on a 4.0 scale) and required minimum grade of “C” in each of the prerequisite courses.

Use of High School Record: • Not used for admission purposes but required upon acceptance

Number of Articulation Agreements: • Two: Blinn College and Austin Community College

TOEFL: See website for additional information

Other Requirements: Entrance exam for pre-licensure applicants; Reference for RN to BSN applicants; Personal Statement for all applicants through Apply Texas

**Texas A&M University at Galveston**

Texas A&M University at Galveston offers ocean oriented undergraduate and graduate curricula leading to Texas A&M University degrees in Maritime Studies, Marine Biology, Marine Engineering Technology, Marine Fisheries, Marine Sciences, Marine Transportation, Maritime Administration, Offshore and Coastal Systems Engineering, Ocean and Coastal Resources and University Studies. Graduate curricula are offered in Marine Resource Management (master’s level), Marine Biology (master’s and doctorate levels) and Maritime Administration and Logistics (master’s level). Applicants who wish to enroll must meet all requirements for admission as specified in the online catalog for Texas A&M University at Galveston. Admission information for Texas A&M University at Galveston may be obtained from the Office of Student Relations in Galveston. Results of the Scholastic Aptitude Test (Code 6835) or American College Test (Code 6592) should be sent directly to Texas A&M University at Galveston. The Texas A&M Maritime Academy at Texas A&M University at Galveston offers a training program concurrently with four undergraduate programs. These programs lead to licensing as a merchant marine officer.

For further information, see the section on Texas A&M University at Galveston or www.tamug.edu.

Office of Student Relations
Texas A&M University at Galveston
P. O. Box 1675
Galveston, TX 77553-1675
(409) 740-4428
Toll free: 1-87-SEAAGGIE
seaaggie@tamug.edu
www.tamug.edu

**Graduate Admission**

For information or applications for graduate admission, please contact:

Office of Graduate Admissions
Texas A&M University
P. O. Box 40001
College Station, TX 77842-4001
(979) 845-1060
graduate-admission@tamu.edu
http://admissions.tamu.edu/graduate

Please reference the Texas A&M University Graduate and Professional Catalog on this website.

**Registration and Academic Status**

Registration for the fall and spring semesters is accomplished at several times. During the fall and spring semesters (in November and April), a preregistration period is held for currently enrolled and readmitted students to register for the next semester. There are periods of announced open registration for students who were unable to preregister during the scheduled preregistration period. New Student Conferences serve as an opportunity for new undergraduate students to register. Further information concerning registration may be obtained from the academic calendar published in this catalog or from the Office of the Registrar. The schedule of classes is available online.

**Full-Time Student**

A full-time undergraduate student is defined as one who is registered for 12 semester hours during a fall or spring semester or 8 hours in a summer semester. Full-time enrollment for federal financial aid is always defined as 12 semester hours, including the summer term. A Q grade or W grade does not count toward the certification of enrollment status. Only hours for which a student is currently enrolled at Texas A&M University can be used toward certification of enrollment.

**Undergraduates Registering for Graduate Courses**

A senior undergraduate student with a cumulative grade point average of at least 3.0 or approval of his/her academic dean, is eligible to enroll...
in a graduate course and reserve it for graduate credit by filing a petition obtained from the student’s undergraduate college and approved by the course instructor, the student’s major department head, the dean of the college offering the course, and the dean of the student’s undergraduate college.

An academically superior undergraduate student with a cumulative grade point average of at least 3.25 or approval of his/her academic dean, is eligible to apply graduate credit hours toward his/her undergraduate degree program by filing a petition obtained from the student’s undergraduate college and approved by the course instructor, the student’s major department head, the dean of the college offering the course, and the dean of the student’s undergraduate college. Graduate credit hours used to meet the requirements for a baccalaureate degree may not be used to meet the requirements for a graduate degree.

VA Benefits

Students who are military veterans should note that to receive full VA benefits they must be registered for enough hours to be considered full-time for their degree during each term they are seeking benefits. This number may differ between degrees and during the summer semester. For hour requirements, please visit Veterans Services.

Maximum Schedule

An undergraduate student with an overall grade point average of 3.0 or better may register for a course load in excess of 19 hours in a fall or spring semester with the approval of his or her advisor. An undergraduate student with an overall grade point average of less than 3.0 must obtain approval of his or her dean before registering for a course load in excess of 19 hours in a fall or spring semester.

Classification

Each student has a classification which indicates the type of degree program in which the student is enrolled, and reflects the student’s progress within that program. The classifications are:

<table>
<thead>
<tr>
<th>Code</th>
<th>Classification</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>U0</td>
<td>Undergraduate Non-degree</td>
<td>Students with a high school diploma (with the exception of high school concurrent enrollment participants) who do not intend to pursue a baccalaureate degree at Texas A&amp;M University. This includes:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>a. Summer session only students.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Local residents or university employees taking courses on a part-time basis.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Others as may be deemed appropriate by the Office of Admissions and the college or program of admission.</td>
</tr>
<tr>
<td>U1</td>
<td>Freshman 0-29 hours</td>
<td></td>
</tr>
<tr>
<td>U2</td>
<td>Sophomore 30-59 hours</td>
<td></td>
</tr>
<tr>
<td>U3</td>
<td>Junior 60-89 hours</td>
<td></td>
</tr>
<tr>
<td>U4</td>
<td>Senior 90+ hours</td>
<td></td>
</tr>
<tr>
<td>U5</td>
<td>Postbaccalaureate Undergraduate</td>
<td>Students with a recognized baccalaureate degree who wish to complete requirements for a second baccalaureate degree at Texas A&amp;M University or to complete established Texas A&amp;M University certification requirements.</td>
</tr>
</tbody>
</table>

Undergraduate non-degree students are not permitted to enroll in courses until all degree seeking students have had the opportunity to enroll. Undergraduate non-degree enrollment begins on the first day of open registration. Enrollment may be limited by college or program policies. Admitted students are not eligible for refund of the admission processing fee regardless of course availability.

An undergraduate non-degree student must maintain a 2.0 GPA on all coursework attempted to remain eligible to register. Enrollment is subject to review at the end of each semester of enrollment. Enrollment beyond two years of attendance will be approved only in exceptional cases.

Should an undergraduate non-degree student desire admission to a degree program, regular formal application is necessary, including: a complete application for admission, the required application processing fee, the submission of all required credentials, and the meeting of all admission requirements.

An undergraduate non-degree student may not take graduate-level coursework.

Undergraduate non-degree students are subject to TSI and English proficiency requirements.

An undergraduate non-degree student does not qualify for financial aid through the University.

With few exceptions, undergraduate non-degree status is not available to international students.

The postbaccalaureate undergraduate classification (U5) has all the privileges and responsibilities of a senior classification (U4).
Distinguished Student and Dean’s Honor Roll

An undergraduate student who completes a semester schedule of at least 15 graded hours or a summer session schedule of at least 12 graded hours with no grade lower than C and with a grade point average of not less than 3.5 for the semester or for a summer session shall be designated “distinguished student.” A student who, under the same circumstances, achieves a grade point average of at least 3.75 shall also be designated as a member of the “dean’s honor roll.” First semester freshmen must complete a semester schedule of at least 15 hours with no grade lower than C, no Q-drops and with a grade point average of not less than 3.5 for “distinguished student” designation and a 3.75 for “dean’s honor roll.”

Official notification of these designations will be issued to the student by the dean of the student’s college. The hours earned with a grade of S shall not be included in determining minimum hours required for the designation of “distinguished student” or “dean’s honor roll.” A grade of I or U disqualifies a student from being considered as a “distinguished student” or for the “dean’s honor roll.” Grades of Q, W, and NG may not be included in the 15 graded hours. Only undergraduate courses or graduate courses used for the undergraduate degree will be used in either calculation.

Scholastic Probation

Scholastic probation is conditional permission for an undergraduate student to continue in the University after he or she has become scholastically deficient. For university policy regarding scholastic deficiency and scholastic probation, see the Texas A&M University Student Rules (http://student-rules.tamu.edu).

Withdrawal from the University

A student wishing to withdraw from the University before the completion of a semester or summer term is required to comply with the official withdrawal procedure. This process is initiated by submitting a request through the Student Withdrawal channel on the My Record tab in the Howdy portal. Students may not withdraw after the Q-drop deadline. The student’s dean will retain the authority to support a student withdrawal after the deadline.

During the summer session, a student must withdraw from the University if the student decides to drop all in progress courses and does not intend to enroll in any subsequent summer session.

For university policy regarding withdrawal, see the Texas A&M University Student Rules (http://student-rules.tamu.edu).

Correct Addresses

It is necessary to have a correct residence address on file with the University. Students may change their address in Howdy. International students must have a correct physical and permanent address. International students must go to International Student Services to change their physical and the permanent addresses.

Texas A&M may also use email for official communications. It is each student’s responsibility to claim his/her Texas A&M University email account (http://gateway.tamu.edu) and to check that account on a frequent and consistent basis.

Grading System

Because students attend a college or university to extend their education, grades are usually given as an indication of the proficiency of their endeavors. The student’s semester grade in a course shall be based upon performance and/or participation in class, exercises and tests, laboratory work and final examination as applicable to the course. The proportionate weight assigned to each of the factors shall be determined by the department administering the course.

The basis upon which the final grade will be determined shall be distributed in written form to the class during the first class meeting.

There are five passing grades at the undergraduate level, A, B, C, D and S, representing varying degrees of achievement; these letters carry grade points and significance as follows:

<table>
<thead>
<tr>
<th>Letter</th>
<th>Description</th>
<th>Grade Points per Semester Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Excellent</td>
<td>4</td>
</tr>
<tr>
<td>B</td>
<td>Good</td>
<td>3</td>
</tr>
<tr>
<td>C</td>
<td>Satisfactory</td>
<td>2</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
There are two failing grades, F and U, indicating work of unsatisfactory quality.

**Repetition of a Course to Improve Grade**

Any undergraduate student who wishes to repeat a course must do so before he or she completes a more advanced course in the same subject. What constitutes a more advanced course will be determined by the head of the department offering the course.

Credit for a course failed may be obtained only by registering for and repeating the course. The original grade will remain on the student’s permanent record, and both grades will be used in computing the GPA. An F or U previously earned is not removed once the course is passed. Credit for each repeated course may only be used once toward degree requirements.

A student repeating a course completed at Texas A&M University in which a grade of B or better has been earned will not receive grade points for the repeated course, unless the catalog states the course may be repeated for credit.

**I and X Grades**

A temporary grade of I (incomplete) at the end of a semester or summer term indicates that the student has completed the course with the exception of a major quiz, final examination or other work. The instructor shall give this grade only when the deficiency is due to an authorized absence or other cause beyond the control of the student. When an instructor reports an incomplete grade to the Office of the Registrar, he or she will fill out an “Incomplete Grade Report,” which is filed with the department head. Copies are sent to the student and to the student’s academic dean. This report includes:

1. a statement of the instructor’s reason for awarding the incomplete grade and
2. a statement concerning the remaining work to be completed before the last day of scheduled classes of the next fall or spring semester in which the student enrolls in the University unless the student’s academic dean, with the consent of the instructor (in the absence of the instructor, the department head), grants an extension of time for good reason.

If the incomplete work is not completed within this time or if the student registers for the same course again, the I will be changed to an F by the Office of the Registrar.

The X notation is assigned to a course by the Office of the Registrar at the end of a semester or summer term only when a grade is not submitted by the instructor. The Office of the Registrar will notify the dean of the college in which the course is taught that an X notation has been made. The dean of the college offering the course will request, through the department head, that the instructor submit a Grade Change Report Form removing the X notation and assigning a letter grade. The instructor will have 30 days from the beginning of the succeeding semester or summer term to report a change of grade to the Office of the Registrar. If a Grade Change Report Form is not received during this time period, the Office of the Registrar will automatically remove the X notation and assign a grade of F.

**Q-Drop and Add and Drop**

1. A student may enroll in a class during the first five class days of a fall or spring semester or during the first four class days of a summer term. A student requesting to add a course after these deadlines must have the approval of the student’s dean or designee and department.
2. A student may drop a course with no record during the first 12 class days of a fall or spring semester and during the first four class days of a summer term. Following this period, if approved by the dean of the college or his or her designee, a student may drop a course without penalty through the 60th class day of a fall or spring semester, the 15th class day of a summer term or the 35th class day of a 10-week summer semester. The symbol Q shall be given to indicate a drop without penalty.

Under section 51.907 of the Texas Education Code, “an institution of higher education may not permit a student to drop more than six courses, including any course a transfer student has dropped at another institution of higher education.” This statute was enacted by the State of Texas in spring 2007 and applies to students who enroll in a Texas public institution of higher education as first-time freshmen in fall 2007 or later. Any course that a student drops is counted toward the six-course limit if: (1) the student was able to drop the course without receiving a grade or incurring an academic penalty; (2) the student’s transcript indicates or will indicate that the student was enrolled in the course; and (3) the student is not dropping the course in order to withdraw from the institution.” Some exemptions for good cause could allow a student to drop a course without having it counted toward this limit, but it is the responsibility of the student to establish that good cause.

Undergraduate students at Texas A&M University will normally be permitted four Q-drops during their undergraduate studies. However, in order to comply with this statute a student who has dropped courses at other Texas public institutions may not be permitted four Q-drops if the student’s total number of dropped courses would exceed the State limit of six.

3. Any course taught on a shortened format or between regularly scheduled terms will have add/drop, Q-drop and withdrawal dates.

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<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Passing, 1 grade point per semester hour</td>
</tr>
<tr>
<td>F</td>
<td>Failing, no grade points, hours included in GPA calculation</td>
</tr>
<tr>
<td>I</td>
<td>Incomplete, no grade points, hours not included in GPA calculation</td>
</tr>
<tr>
<td>NG</td>
<td>No grade, grade removed from record, no grade points, hours not included in GPA calculation</td>
</tr>
<tr>
<td>Q</td>
<td>Course dropped with no penalty, no grade points, hours not included in GPA calculation</td>
</tr>
<tr>
<td>S</td>
<td>Satisfactory (C or above), no grade points, hours not included in GPA calculation</td>
</tr>
<tr>
<td>U</td>
<td>Unsatisfactory (D or F), no grade points, hours included in GPA calculation</td>
</tr>
<tr>
<td>X</td>
<td>No grade submitted, no grade points, hours not included in GPA calculation</td>
</tr>
<tr>
<td>W</td>
<td>Withdraw, no grade points, hours not included in GPA calculation (effective Spring 1996)</td>
</tr>
<tr>
<td>F*</td>
<td>Aggie Honor Code violation, no grade points, hours included in GPA calculation</td>
</tr>
</tbody>
</table>
proportionally the same as if the course were offered in a regular term. These dates will be determined by the Office of the Registrar.

4. A student who drops a course after the Q-drop period has elapsed will receive a grade of F unless unusual circumstances exist as determined by the student’s dean. A grade of W may be recorded by the dean of the student’s college if it is determined such circumstances do exist.

Satisfactory/Unsatisfactory

Undergraduate students may be permitted to take courses in their degree programs at Texas A&M University on a satisfactory/unsatisfactory (S/U) basis consistent with the requirements of the student’s college. The hours for which a student receives a grade of satisfactory shall not be included in the computation of the student’s semester or cumulative GPA; a grade of unsatisfactory shall be included in the computation of the student’s grade points per credit hour as an F. A grade of satisfactory (S) will be given only for grades of C and above; a grade of unsatisfactory (U) will be given for grades D and F. The hours earned on a satisfactory/unsatisfactory basis shall not be included in the designation of distinguished student or dean’s honor roll.

Students on probationary standing may be required to take KINE 199 or electives on an S/U basis as determined by published college policies. Students entering Texas A&M University in the fall 2001 semester and later must enroll in their first KINE 199 on an S/U basis. Effective fall 2003, Health and Kinesiology majors must enroll in KINE 199 as a graded course. Students registered for KINE 198 or additional classes of KINE 199 who wish to change the grade type from a graded course to S/U or from S/U to a graded course, may do so in Howdy. All requests for KINE 198 and KINE 199 changes must be completed on or before the Q-drop deadline for the fall, spring or summer semester.

Students must register for courses on an S/U basis during the official registration periods and shall not be permitted to change the basis on which their grades will be recorded on their official transcripts, except for unusual circumstances and with the approval of the student’s academic dean.

Semester Credit Hour

A lecture course which meets one hour per week for 15 weeks is worth 1 semester credit hour. Thus, a course worth 3 semester credit hours, meets three hours per week. Credit hours for laboratory courses are determined to be some fraction of the number of hours spent in class.

The State of Texas defines a semester credit hour in Rule 4.6 of the Texas Administrative Code, “Minimum Length of Courses and Limitation on the Amount of Credit that a Student May Earn in a Given Time Period”. For more information on Rule 4.6, please visit the State of Texas webpage.

Grade Point Average (GPA)

Only the grade earned in coursework for which the student was registered in this institution shall be used in determining his or her grade point average. Students anticipating graduating with honors should refer to that section of this catalog for information concerning the computation of grade point averages for that purpose.

A student’s grade point average for any period shall be computed by dividing the total number of semester hours for which he or she received grades into the total number of grade points earned in that period. Semester credit hours to which grades of F or U are assigned shall be included; those involving grades of W, Q, S, X, NG and I shall be excluded.

Classification

Classification for academic purposes shall be based solely on scholastic progress as shown by the official records in the Office of the Registrar. Sophomore, junior and senior classification will be granted students who have passed 30, 60 and 90 semester hours, respectively.

Grade Reports

Midsemester Report

Near the middle of the fall and spring semesters, a preliminary report, showing the current progress of all undergraduate students who have completed less than 30 semester credit hours of coursework at Texas A&M, and of a selected group of other undergraduate students that the academic deans/departments are monitoring, will be made available. Preliminary grades are not recorded on the student’s permanent record. Grades are available in Howdy.

Final Grade Report

End of semester final grades are available in Howdy. No student grade may be posted in a manner that is personally identifiable unless the student has given written consent in advance.

Parent/Guardian Access to Grades

A parent or guardian may access midterm and final grades in Howdy after the student sets the parent access password. The Office of the Registrar cannot access the passwords created by students for parental access.

Transcripts

Students applying for admission to Texas A&M are required to submit transcripts of previous academic work and in some cases, results of standardized tests. The submission of altered documents or the failure to furnish complete and accurate information on admission forms will be grounds for disciplinary action.

Individuals who have attended the University may obtain an official transcript of their completed work, provided they have no financial obligations to the University. A fee, which, according to state law must be paid in advance, will be charged for each copy. During grading and degree posting, official transcripts may be produced for enrolled students only if all courses for that semester or term are shown as in progress (IP) or have all final grades posted. Students and former students may submit a Transcript Request Order form in person, by mail, by email, by fax or by completing the transcript request form in the Howdy portal. Transcript requests will not be accepted over the phone. A faxed or emailed request must be paid using a credit card from a United States bank. A transcript request ordered through the Howdy portal must be paid either by electronic check (ECH) or by credit card from a United States bank. Requests made in person or by mail may only be paid with check, money order or a credit card.

Housing

Adult, Graduate and Off Campus Student Services

http://agoss.tamu.edu
AggieSearch provides students access to apartment and property listings, as well as roommate search options.

The Off Campus Survival Manual introduces students to the community and covers leases, transportation, security deposits, cost estimates, and more.

On-Campus Housing and White Creek Apartments
http://reslife.tamu.edu

Admission to the University is required prior to application for campus housing.

Undergraduate students can apply for campus housing online. Applications should be completed as soon as possible following admission since the date of application for housing is important in the housing assignment process. An application fee and housing deposit (or applicable waiver) are required at the time of application.

On-campus housing is assigned on a first-come, first-served basis. With the exception of the Corps of Cadets, students are not required to live on campus at Texas A&M.

University Apartments (The Gardens)
http://reslife.tamu.edu/apartments

Available for graduate students, married students, students with dependent children, international students, U.S. military veteran students, students who are at least 21 years old, or undergraduate students who have completed at least 30 credit hours.

Fully furnished one- and two-bedroom units are available. Rent for The Gardens can be monthly or by semester and includes furniture, parking, cable TV service and high-speed Internet. Students pay electricity. All leases are either 9- or 12-month leases.

Application forms, rental rates and additional information may be obtained online.

Orientation

Aggie Honor System Office
http://aggiehonor.tamu.edu

All Texas A&M students, graduate and undergraduate, part-time or full-time, in residence or in distance education, are expected to follow the guiding rule of the Aggie Honor Code: “An Aggie does not lie, cheat, or steal or tolerate those who do.”

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning, and to follow the philosophy and rules of the Aggie Honor System Office (http://aggiehonor.tamu.edu). Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the Texas A&M community from the requirements or the processes of the Aggie Honor System Office.

ExCEL Program
http://excel.tamu.edu

Texas A&M University’s Excellence Uniting Culture, Education, and Leadership (ExCEL) is a student organization and student support program housed in the Department of Multicultural Services.

ExCEL focuses on freshman students by helping them discover the academic, social, and personal balance necessary to facilitate their success at Texas A&M University and beyond. Through Freshman involvement programs and peer mentor interactions during the Fall semester, ExCEL helps build a sense of community by assisting freshmen in making a smooth transition from high school to college.

ExCEL kicks-off the program with a two-day Orientation Conference held the week before fall classes begin, familiarizing participants with the program and life at Texas A&M University.

Fish Camp
http://fishcamp.tamu.edu

Fish Camp is an optional program intended to provide incoming students the opportunity to establish friendships, meet student leaders, become familiar with Aggie traditions and learn about Texas A&M campus life. Faculty and staff members speak on topics such as study habits, personal goals, Aggie traditions and history, involvement and campus services. Held during a three-week period preceding the fall semester, each four-day, three-night session is designed to aid students in the transition from high school to college and, particularly, to Texas A&M.

In addition to providing educational programs, group activities and small group discussions, the camp allows students to get to know each other through recreation, intramural sports and evening theme mixers. Fish Camp is not just a four-day activity in August; activities typically continue through the first month of the Fall semester. For more information on Fish Camp and how to register for a session, please visit our website.

Howdy Camp
http://atc.tamu.edu

Howdy Camp is a student-run, three-day, two-night extended orientation camp program for freshman and transfer students entering Texas A&M University in the spring semester.

Howdy Camp is the spring semester’s equivalent to Fish Camp and T-Camp. Held over a three-day period in January prior to spring classes, new Aggies are introduced to the many traditions, indescribable spirit, and customs of Aggieland. Additionally, Howdy Camp doesn't end when the bus leaves camp! Camp Counselors continue to be available and serve as resources during the semester as students complete their transition into Texas A&M. Howdy Camp is hosted by the student organization Aggie Transition Camps.

New Student Conferences
http://studentlife.tamu.edu/nsfp

• Held each year for undergraduate students entering Texas A&M University. New students are required to register for and attend a conference in order to accept their offer of admission and register for classes.
• During the conference, new students will meet with academic advisors for curriculum advisement and selection of their first semester courses.

• In addition to referral services for students during their first year, New Student and Family Programs coordinates the following programs: New Student Conferences (NSC); Gig ‘Em Week: Aggieland’s Week of Welcome, full of free events and opportunities for new and returning students.

• Resources:
  • Parent and Family Programs – resources and services for family members
  • New Aggie News newsletter
  • New Student Handbook
  • Family Calendar designed specifically for family members of newly admitted students
  • Aggie Connection Newsletter – provides family members information on campus events, issues facing first-year students, and updates on campus resources.

Transfer Camp (T-Camp)
http://atc.tamu.edu

Held in August each year, T-Camp is a three-day, two-night extended orientation camp experience for transfer students entering Texas A&M in the summer and fall semesters. Through staff presentations, student skits, and small group discussion time, new students will leave camp with knowledge about Texas A&M campus resources and many new friends.

Additionally, T-Camp doesn't end when the bus leaves camp! Your counselors will continue to be available and serve as resources as you complete your transition into Texas A&M. Counselors will be at the T-Camp Backyard Bash reunion, will show you around the MSC Open House, and will plan frequent camp hangouts. Counselors will also coordinate campus tours so that you are not lost on your first day! T-Camp is hosted by the student organization Aggie Transition Camps.

Services for Students

Academic Advising (p. 72)
Academic Success Center (p. 72)
The Association of Former Students (p. 72)
Career Center (p. 72)
Disability Services (p. 73)
Gay, Lesbian, Bisexual, Transgender (GLBT) Resource Center (p. 73)
George Bush Presidential Library and Museum (p. 73)
Health Promotion (p. 73)
Human Resources (p. 73)
International Student Services (p. 73)
International Student Services, Sponsored Student Programs (p. 73)
Professional School Advising (p. 74)
Student Conduct Office (p. 74)
Student Counseling Service (p. 74)
Student Health Services (p. 74)
Student Legal Services (p. 74)
Technology Resources (p. 74)
University Libraries (p. 74)
University Police (p. 74)
University Writing Center (p. 74)
Veteran Resource and Support Center (VRSC) (p. 74)
Veteran Services Office (Scholarships & Financial Aid) (p. 75)

Women’s Resource Center (WRC) (p. 75)

Academic Advising

• Academic advising is a collaboration between a student and an academic advisor. Through teaching and learning experiences, the student sets goals, acquires information and services, and makes decisions consistent with interests, goals, abilities and degree requirements.

• Academic advising at Texas A&M University is an important component of student learning, contributing to the success of all students through:
  • Supporting student achievement of the University Learning Outcomes and commitment to learning for a lifetime
  • Being responsible to and respectful of the individual student
  • Encouraging commitment to lifetime learning by directing students toward opportunities to interpret, reflect upon, and apply their classroom experiences in ways relevant to their careers and their lives
  • Interpreting and conveying Texas A&M University’s mission to students
  • Supporting the educational policies, procedures and values of the department, college and university; likewise, academic advising relies on the support and resources of the university, college and department
  • Involving other university programs, services and individuals, when appropriate in the advising process
  • Being responsible for professional academic advising, training, development and practices

Academic Success Center
http://successcenter.tamu.edu

• Academic Coaching
• Workshops and courses
• Supplemental Instruction (SI)
• Tutor Zones (TZs)/Peer Tutoring
• Texas Success Initiative (TSI)
• Transfer Student Programs (TSP)

The Association of Former Students
www.AggieNetwork.com

• Aggie Ring
• Informational and Interactive Exhibits
• Alumni Services, Giving and Events
• Traveling Aggies

Career Center
HireAggies.com

• The Texas A&M University Career Center provides comprehensive services to students in planning their careers, gaining work-related experience, and securing professional employment upon graduation. Our goal is to assist you every step of the way, from your freshman year through graduation, and after, as a Former Student. We offer a variety of programs, services and resources:
• Career Exploration, Assessment, and Planning
• Job Search Tools, Resume Writing, Interview Preparation
• Professional Networking Resources and Events
• Full-time positions, Internships, Externships, Cooperative Education and Work Abroad
• Presentations to Classes and Student Organizations, Workshops and Panel Discussions, Career Fairs, and Webinars
• Employer Contacts, Campus Recruiting
• Individual appointments, Walk-in Advising, Mock Interviews

One of the largest programs of its kind in the nation, the Career Center has been recognized nationally and regionally for our many Best Practices. In a Wall Street Journal survey, recruiters ranked Texas A&M as the second most preferred university in hiring college talent nationwide. The Career Center can be found online at HireAggies.com (http://HireAggies.com) and is located in the Koldus Building, Suite 209. You can also Like us on Facebook and Follow us Pinterest, Twitter, and YouTube.

Disability Services
http://disability.tamu.edu

• Reviews and maintains student disability documentation
• Determines appropriate accommodations
• Facilitates exam accommodations
• Provides sign language interpreting and transcription services
• Obtains course materials in alternative formats
• Consults on disability-related issues

Gay, Lesbian, Bisexual, Transgender (GLBT) Resource Center
http://glbt.tamu.edu

Resource and Referral Center that Provides:
• Resource Library (Books, Periodicals, Brochures and Films)
• Programming
• Education
• Advocacy
• Leadership Development
• Visibility

George Bush Presidential Library and Museum
http://Bush41.org

The George Bush Presidential Library and Museum at Texas A&M University is dedicated to preserving and making available the records and artifacts of George H.W. Bush, 41st President of the United States. We promote civic literacy and increased historical understanding of our national experience, and foster a community of public service and volunteerism. We accomplish this mission by offering:
• Rich Educational and Public Programs
• Original Museum Exhibits
• Access to our Archival Holdings
• Research Opportunities
• Special Events
• Unique Volunteer and Internship Positions
• Foundation Memberships

The George Bush Presidential Library and Museum can be found online at http://Bush41.org and is located at 1000 George Bush Drive West, College Station, Texas 77845. For additional information on the resources the George Bush Presidential Library and Museum have to offer please call 979-691-4000 for all Museum inquiries or 979-862-2251 for all Foundation or Membership inquiries.

Health Promotion
http://studentlife.tamu.edu/hp

• Provide educational health information and consultation
• Presentations available upon request
• Body fat analysis
• Provide educational information regarding alcohol and other drugs
• Peer health educator training and outreach
• Resource tables or interactive programming available for student events

Human Resources
http://employees.tamu.edu

• Health Insurance and Benefits
• Job Listings
• Student Worker Positions

International Student Services
http://iss.tamu.edu

Support Services for International Students:
• Pre-Arrival Information
• Certificates of Eligibility (Forms I-20 and DS-2019)
• On-line Orientation and International Student Conference
• Represent the University with the Department of Homeland Security, Department of State and the Student Exchange Visitor Information System (SEVIS)
• Assist Students with Federal Immigration Regulation Compliance
• Liaison for Students, University and Community
• International Student Employment Information
• Administration of Scholarships and Loans
• Provide Specialized Services for Students
• Community Involvement Activities

International Student Services, Sponsored Student Programs
http://iss.tamu.edu/Side-Menu/Sponsored-Students

Support Services for International Sponsored Students:
• Admissions Liaison
• Academic Program Development and Compliance
• Assist with Contractual Agreements between the Students and Sponsors
• Third Party Billing
• Partner with English Language Institute (ELI) related to sponsored students and admission to Texas A&M University
• Academic, Immigration, Personal Advising and Services
• Liaison between Academic Departments, Student and Sponsors

**Professional School Advising**
http://oea.tamu.edu

• Pre-Medical, Pre-Veterinary and Pre-Health Professions Advisory Services
• Pre-Law Advisory Services
• Preprofessional Student Organizations

**Student Conduct Office**
http://studentlife.tamu.edu/sco

• Receive and process reports of alleged student rule violations
• Presentations available upon request

**Student Counseling Service**
http://scs.tamu.edu

• Career Counseling
• Stress Management
• Personal Counseling
• HelpLine
• Crisis Intervention

**Student Health Services**
(Accredited by Accreditation Association for Ambulatory Health Care)
http://shs.tamu.edu

Clinics:
- Medical Clinic
- Preventive Medicine
- Women’s Clinic
- Specialty Clinics

Ancillary:
- Medical Laboratory
- Radiology Services

Additional Services:
- Ambulance Service/EMS
- Dial-A-Nurse
- Dietitian
- Pharmacy
- Physical Therapy
- Insurance – http://academichealthplans.com/tamu

• Appointments – Monday - Friday, 8 a.m. - 5 p.m.

**Student Legal Services**
http://studentlife.tamu.edu/sls

• Notary
• Legal Consultation
• Mediation

**Technology Resources**
http://it.tamu.edu

• Internet Access
• Campus Wireless
• Texas A&M Email
• 24-Hour Technical Support (http://hdc.tamu.edu)
• Campus Computer Labs

**University Libraries**
http://library.tamu.edu

• Sterling C. Evans Library (http://library.tamu.edu)
• West Campus Library (WCL) (http://wcl.library.tamu.edu)
• Medical Sciences Library (MSL) (http://msl.library.tamu.edu)
• Policy Sciences & Economics Library (PSEL) (http://psec.library.tamu.edu)
• Cushing Memorial Library and Archives (http://cushing.library.tamu.edu)

**University Police**
http://upd.tamu.edu

• Law Enforcement and Criminal Investigations
• Crime Prevention Programs

**University Writing Center**
http://writingcenter.tamu.edu

• Online Writing and Speaking Resources – The Handouts and Guides section on http://writingcenter.tamu.edu includes print, audio, and video help for writers and public speakers.
• Face-to-Face and Online Consultations on Writing and Public Speaking – Make an appointment via http://writingcenter.tamu.edu for feedback on speeches, writing, posters, presentation slides, videos, and multimodal communication. Come in person, send work online, or meet in a web conference. You can also schedule appointments for group writing projects.
• Workshops and Studios on Writing and Public Speaking – Available for classes, organizations, or events around campus, workshops present information and engage participants in practice; studios combine instruction with an extended opportunity to write and seek advice from a consultant.

**Veteran Resource and Support Center (VRSC)**
http://aggieveterans.tamu.edu
• Aggie Veteran Network – “One-stop referral shop” for military-affiliated student resources (veterans, active duty, reserve/National Guard, dependents and survivors).
• Academic and Student Life Support – Connect with academic assistance and student life resources to meet individual requirements.
• Military Admissions Liaison – Located in the VRSC to assist veteran students in the admission process, academic credit for military service and military withdrawals.
• Vet Success on Campus – Connect with our campus VA Counselor for VA related inquiries, support and programs.
• Peer Advising for Veteran Education (PAVE) – Connect new veteran students with current veteran students to facilitate the transition to Texas A&M University.
• Student Vet Association – Student organization for veteran students. Opportunity to meet other vets and be part of the Aggie veteran community.

Veteran Services Office (Scholarships & Financial Aid)
http://veterans.tamu.edu

• Assists eligible students in securing federal and state veterans’ education benefits and other educational funding including scholarships and financial aid

Women’s Resource Center (WRC)
http://wrc.tamu.edu

• Provides presentations and programming on a variety of topics related to women as well as power based personal violence
  • Women’s Leadership Programming - Elect Her: Aggie Women Win, $tart $mart Salary Negotiation Workshops, and the International Women’s Day Conference
  • Power based personal violence education programming - the Silent Witness Project, SHARP Classes, and Denim Day.
• On campus lactation space locator through the Breastfeeding Welcomed Here Campaign
• Home of the Green Dot Bystander Intervention Program
• Advises two student organizations: Aggie Women in Leadership (AWIL) and Student Anti-Violence Educators (SAVE)
• Resource Library

Campus Life

The Corps Experience (p. 75)
Department of Multicultural Services (p. 75)
Office of Fraternity and Sorority Life (OFSL) (p. 75)
Intercollegiate Athletics (p. 76)
Memorial Student Center (MSC) (p. 76)
Music Activities (MUSA) (p. 76)
Recreational Sports (p. 77)
Speech and Debate Team (p. 77)
Student Activities (p. 77)
Student Government (SGA) (p. 77)
Student Life (p. 78)
Student Life Studies (p. 78)
Student Media (p. 78)
University Art Galleries (p. 78)
University Center and Special Events (UCEN) (p. 78)

Vice President for Student Affairs (p. 78)

The Corps Experience
http://corps.tamu.edu

• The Corps of Cadets is the largest and most visible student organization at Texas A&M. Known as the Keepers of the Spirit and the Guardians of Tradition, many of Texas A&M’s most cherished traditions grew out of the Corps, including Midnight Yell Practice, Aggie Muster and Silver Taps. Currently, over 2,400 young men and women are Corps members.
• Most cadet graduates pursue a career in the public and private sector; however, the Corps of Cadets consistently commissions more officers than any institution other than the service academies.
• Academic excellence is the top priority of the Corps of Cadets offering scholastic advising and cadet-led support programs as well as access to state-of-the-art academic facilities.
• Cadets who pursue non-military careers declare themselves candidates for the Academic Certificate in Leadership Studies – 12 credit hours of university-recognized leadership coursework noted on the student’s official university transcript.
• The Corps of Cadets offers cadet organizations (The Fightin’ Texas Aggie Band, a precision military band; the Ross Volunteers, the official honor guard for the governor of the state of Texas; the Fish Drill Team, a precision drill unit; and Parsons Mounted Cavalry, the only mounted ROTC unit in the United States), ROTC special units (Army’s Ranger Challenge Team and Rudder’s Rangers, Navy SEAL Platoon, Marine Recon Platoon and the Air Force’s Arnold Air Society) and advanced course ROTC contracts.

Department of Multicultural Services
http://dms.tamu.edu

• Home to several student organizations and learning experiences fostering environments for student engagement, development and learning. Our student organizations include Aggies 2 Aggies; Asian Presidents’ Council (APC); Black Student Alliance Council (BSAC); Hispanic Presidents’ Council (HPC); Excellence Uniting Culture, Education, and Leadership (ExCEL); and Southwestern Black Student Leadership Conference (SBSLC).
• Outside of student organizations, we offer additional developmental opportunities including African American Student Leadership Institute (AASLI), Community Conversations, Cultural Day Trips, Cultural Leadership Understanding and Exploration for Sophomores (CLUES), Diversity Training Institute (DTI) and Institute for the Development and Education of Asian American Leaders (IDEAAL). Our department is also home to a free tutorial service providing one-on-one and small group tutoring in specific courses.

Office of Fraternity and Sorority Life (OFSL)
http://aggiegreeks.tamu.edu

• Housed in the Department of Student Activities, the Office of Fraternity and Sorority Life’s mission is to build an inclusive fraternity and sorority community at Texas A&M and enhance the collegiate experience by supporting opportunities for leadership, academic success, civic engagement and the creation of fraternal bonds. Our office serves as a liaison among our collegiate chapters, parents, alumni, international organizations, and Texas A&M University to provide organizational
guidance, educational programs, and resources while challenging members to live their fraternal values.

- Fraternities and Sororities are a fundamental part of Texas A&M University. We are home to 58 internationally affiliated or local Greek-letter organizations governed by one of four councils: Collegiate Panhellenic Council (CPC), the InterFraternity Council (IFC), the Multicultural Greek Council (MGC), and the National Pan-Hellenic Council (NPHC). Our fraternities and sororities collectively constitute the largest membership-based and multi-faceted community on campus.

- Representing 10 percent of the undergraduate student population, fraternity and sorority members are committed to their academics, developing and strengthening their leadership skills, volunteering time in the community and continually forming a campus and cultural support network for current and incoming Aggies. Fraternities and sororities have enhanced the lives of more than 20,000 Aggies since their inception.

**Intercollegiate Athletics**

www.aggieathletics.com

- Texas A&M is a member of the National Collegiate Athletic Association (NCAA) and the prestigious Southeastern Conference (SEC), which also includes the University of Alabama, University of Arkansas, Auburn University, University of Florida, University of Georgia, University of Kentucky, Louisiana State University, University of Mississippi, Mississippi State University, University of Missouri, University of South Carolina, University of Tennessee and Vanderbilt University.

- Texas A&M sponsors 20 intercollegiate athletics teams. The nine men’s programs are football, basketball, baseball, golf, indoor track and field, outdoor track and field, cross country, swimming and diving, and tennis. The 11 women’s programs are basketball, cross country, golf, indoor track and field, outdoor track and field, softball, swimming and diving, tennis, volleyball, soccer and equestrian.

- Texas A&M brought home four national champion titles in 2011 as the women’s basketball team, the men’s and women’s outdoor track and field squads and the women’s western equestrian all won their respective national championships. The track and field program accomplished the double national titles for the third straight year, a historic accomplishment in NCAA history.

- Aggie athletes have earned more than 800 All-American citations and hundreds have gone on to successful professional careers in their respective sports. In addition, Texas A&M has produced a number of Olympic athletes, including a record number of Aggies who competed in the 2012 Summer Olympic Games.

- The mission of Texas A&M athletics is “Building Champions” and it at the heart of the athletic department’s Mission Statement: “Texas A&M Athletics commits to Building Champions through academic achievement, athletic excellence and national recognition of our student-athletes, teams and programs. We provide our student-athletes with all the necessary tools for them to be Champions in their sport and in life. The integrity of our program takes root in the tradition and spirit of Texas A&M, bringing honor and distinction to our University.”

**Memorial Student Center (MSC)**

http://msc.tamu.edu

- Programming at the MSC, Texas A&M’s student union, enriches the living and learning experience in Aggieland. The MSC’s student-managed program committees produce hundreds of programs each year in the arts, cultural and educational awareness and exploration, leadership development, and service projects on campus and in the community. Our programs include the OPAS performing arts series, art exhibitions in the MSC Reynolds Gallery, concerts, weekly films, lectures and speakers discussing current events and national affairs, the MLK Breakfast, Salsa Dance Night, and MSC Open House.

- MSC programs also offer students excellent academic, personal, and professional development opportunities. Student program committee members learn leadership and professional skills through the experience of managing their own organizations and producing programs for the campus community. Students can get practical experience in budgeting, communication, fund development, team development, program planning and logistics, meeting facilitation, public speaking, and even technical skills such as running sound for a concert or installing an art exhibit.

- The MSC Box Office provides students and organizations with convenient and affordable ticketing, cash handling, and sales services. The Box Office makes selling easier by eliminating the worry and risk of cash handling by providing online sales and by providing extensive reporting capabilities that take the hassle out of accounting tracking sales and cash flow.

**Music Activities (MUSA)**

http://musa.tamu.edu

**Band Opportunities**

- **Fightin’ Texas Aggie Band** – The Fightin’ Texas Aggie Band is nationally known for its precision military marching formations on the football gridiron and is the largest military marching band in the nation. This 400+ member, Corps of Cadets unit is the official marching band of Texas A&M University. Corps of Cadets membership is required as well as an audition with the directors. Please refer to our website (http://musa.tamu.edu) for more information.

- **University Concert Bands** – Wind Symphony, Symphonic Winds, Symphonic Band and Concert Band. These ensembles consist of outstanding wind and percussion players from all areas of the Texas A&M campus. Literature performed by the bands is chosen from the best of traditional and contemporary band works. The bands perform at least two concerts per semester and occasionally participate in off-campus concerts and tours. Students from all majors are welcome in the band, and Corps of Cadets membership is not required. An audition is required to participate in the bands. Please refer to our website (http://musa.tamu.edu) for more information.

- **University Jazz Ensembles** – These two groups utilize standard 17-piece, large jazz ensemble instrumentation for 13 winds and 4 rhythm section instruments. The bands perform select literature from the best traditional and contemporary big band jazz repertoire. The ensembles perform at least two concerts each semester, including campus and community performances. An audition is required to participate in the jazz ensembles. Please refer to our website (http://musa.tamu.edu) for more information.

- **Hullabaloo Band** – The Hullabaloo Band is housed in the Athletic Department and is a sponsored student organization, consisting of 100 student musicians that support Texas A&M Volleyball, and Men’s and Women’s Basketball. The band regularly travels to tournaments with the teams during postseason play. An audition is required to participate in the Hullabaloo Band. Please refer
Choral Opportunities

- Century Singers – The Century Singers is a close-knit family that connects through a shared passion for music. Members also have the opportunity to participate in events throughout the year including overnight retreats and activities such as ice-skating, movie nights, and group dinners. Involvement in both social gathering and formal rehearsals brings members together as Aggies, musicians, and friends. This creates a truly unique and rewarding experience that will be remembered for a lifetime. An audition is required to participate in the Century Singers. Please refer to our website (http://musa.tamu.edu) for more information.

- Singing Cadets – The purpose of the Singing Cadets is to enhance the public relations of Texas A&M University through musical presentations as deemed appropriate by the Director and to develop disciplined leaders of character as defined by the Singing Cadet Handbook. The four pillars of the Singing Cadets are Purpose, Unity, Spirit, and Honor. Together, these four pillars have formed the solid foundation that has inspired and enabled our organization to succeed in carrying out its purpose for over a century. An audition is required to participate in the Singing Cadets. Please refer to our website (http://musa.tamu.edu) for more information.

- Women's Chorus – The Texas A&M Women's Chorus is a recognized student organization that strives to promote excellence in the fine arts and to encourage cultural expansion at Texas A&M. They also aim to provide entertainment for the campus community, and to enhance the perception of the ensemble at all levels. The choir travels throughout Texas, beyond our state borders, and internationally, and performs a varied repertoire of sacred and secular classical selections. An audition is required to participate in the Women's Chorus. Please refer to our website (http://musa.tamu.edu) for more information.

Orchestral Opportunities

- University Orchestras – The orchestra program at Texas A&M consists of two orchestras; the Chamber Orchestra and the Philharmonic Orchestra. Both of these groups are comprised of students from all majors at the university. Both orchestras provide students with outstanding musical experiences while allowing time for academics and other interests. Students in the orchestras perform the best of both string and symphony orchestra literature at a high level of artistic achievement in a focused and supportive environment. An audition is required to participate in the orchestras. Please refer to our website (http://musa.tamu.edu) for more information.

Recreational Sports

http://recsports.tamu.edu

- Most Texas A&M students are automatically Rec Members. All you need is your student ID to utilize the Student Recreation Center (Rec Center) and other Rec Sports facilities. Persons with disabilities are invited to contact Member Services to inquire about accommodations.
- Drop-in recreation encompasses the use of recreational facilities such as swimming/diving pools, walking/jogging track, handball/raquetball courts, and indoor soccer, basketball, volleyball and badminton courts. The Rec Center also features a bouldering wall, an indoor rock climbing facility, outdoor basketball and sand volleyball courts, extensive weight and fitness areas, dance/activity rooms, and a world-class natatorium featuring indoor and outdoor pools and a diving well. Facilities may be used on a drop-in basis except when reserved for classes or university functions. Daily guest passes are available for visitors.
- Rec Sports also offers aquatics classes, group exercise classes, endurance programs/boot camps, personal training, specialty classes, massage therapy, intramural sports, the Texas A&M Sport Clubs program, Outdoor Adventures, CPR certification classes, and the Walk of Champions brick campaign.

Speech and Debate Team

http://speech.tamu.edu

- Compete at national level while impacting the community and the world at a grassroots level.
- Compete in debate, public address events, individual limited preparation events and oral interpretation events.
- Student-run, student-funded and student-oriented organization.

Student Activities

http://studentactivities.tamu.edu

- Student Activities is the premier hub for resources regarding the many leadership and involvement opportunities on campus. At Texas A&M, we care about helping Aggies develop skills both in and out of the classroom that will prepare them for life beyond Aggieland. Whatever it is that you love, Student Activities is here to help you practice your passion through involvement in one of our 1000+ student organizations. The perks of getting involved range from reaching your leadership potential to networking with administrators and potential employers to forming lasting friendships.
- The Department of Student Activities houses some key involvement opportunities through the 50+ fraternity and sorority chapters that can be found in our Center for Fraternity and Sorority Life. The Student Government Association is yet another opportunity for those who are passionate about representing the student voice on campus.
- At Texas A&M, Aggies are held to a high standard of leadership and selfless service. To promote and develop these qualities, our Leadership and Service Center offers a number of leadership programs to help you reach your leadership potential, and it also houses several service-based organizations such as The Big Event and Aggie Replant. We also provide a way for Aggies to connect and volunteer with local community agencies through our AggieServe database (http://aggieserve.tamu.edu).

Student Government (SGA)

http://sga.tamu.edu

- SGA is comprised of the executive, legislative and judicial branches. Members of these branches work to advocate for student needs and help better the Texas A&M campus.
- In addition, SGA has four commissions – Development, Election, Diversity and Legislative Relations. Each of these serve to carry out the goals of the Student Body President from fundraising money for all of SGA to advocating for students at the state level.
- Finally, SGA also houses 14 committees including CARPOOL. The BIG Event, Muster and more. These committees strive to enhance the student body through their leadership, programs, conferences and traditions, and they directly have an impact on the student body and community.
Student Life
http://studentlife.tamu.edu

- The Offices of the Dean of Student Life strive to enhance your opportunities as a student to participate fully in the University experience. We do this by providing you with information, services, programs and involvement opportunities that facilitate responsible life choices and promote awareness of yourself and of your community. Each of the program areas within the Offices of the Dean of Student Life has a specific mission, but one common goal: to provide education, outreach, and support to you.

- Additionally, the department advises the following student organizations: Aggie Orientation Leader Program (AOLP), Aggie Women in Leadership (AWIL), Graduate & Professional Student Council (GPSC), and Parents' Weekend Committee.

- Specific services and programs offered include:
  - Adult, Graduate and Off Campus Student Services
  - Gay, Lesbian, Bisexual, Transgender Resource Center
  - Health Promotion
  - New Student & Family Programs
  - Student Assistance Services
  - Student Conduct Office
  - Student Legal Services
  - Student Media (The Battalion, Aggieland yearbook, Campus Directory)
  - Women's Resource Center

Student Life Studies
http://studentlifestudies.tamu.edu

- Facilitates assessment and evaluation of services and programs and assists in expanding the knowledge base about Texas A&M students and their co-curricular experiences. Department staff can assist with the development of assessment instruments and the collection and analysis of data including web-based programs.

- Student Organization Assessment Center – serves as a resource to recognized student organizations interested in evaluation of their programs and services as well as in the development of missions, goals and strategic plans.

Student Media
http://studentmedia.tamu.edu

- Student Media produces national, award-winning publications; The Battalion newspaper; Aggieland yearbook; and the Campus Directory. All are written, edited and produced by students and offer excellent opportunities to gain valuable experience for journalistic and related careers.

- The Battalion is published Monday through Friday during fall and spring semesters and Tuesday and Thursday during the summer sessions. It is distributed to students, faculty and staff on campus and at many apartments and other high traffic areas in College Station. The Battalion also is available online and on mobile devices.

- The Aggieland is distributed in the fall but is a year-round project documenting school activities. It is one of the nation’s largest college yearbooks.

- The Campus Directory, published each fall, includes listings of departments, administrators, and other information.

University Art Galleries
http://uart.tamu.edu

- The University Art Galleries department provides and promotes cultural opportunities that augment the academic experiences of the Texas A&M community. It is responsible for visual art exhibitions at the J. Wayne Stark Galleries, the Forsyth Galleries and for art inventories at Texas A&M.

- The program organizes the major art exhibitions for the University; advises on the selection, display and management of visual art objects on the campus; handles all art and art-related gifts to the University; and provides guidance and support to all exhibitions and collections at the University. The department also maintains the outdoor sculpture collection for the university.

- In addition, the University Art Galleries department organizes programs to complement exhibitions; has a docent program, which provides guided tours of changing exhibitions on campus and the University’s permanent collections to interested community and school groups as well as other art education programs.

University Center and Special Events (UCEN)
http://ucenter.tamu.edu

- University Center and Special Events (UCEN) is a highly skilled team of professionals committed to creating extraordinary guest experiences. We provide exceptional event management and technical support in state-of-the-art facilities that are well maintained, safe and clean. Through our facilities and services, we enhance the educational, business, social and cultural experiences of students, faculty, staff and visitors of Texas A&M University.

- Event Services – located on the second floor of Rudder Tower, the Event Services team assists in the booking, coordination, setup and staffing of meetings and events held in the Memorial Student Center (MSC), J. Earl Rudder Conference Tower, John J. Koldus Building, All Faiths Chapel, and the surrounding outside event spaces.

- Special Events – located on the first floor of Rudder Theatre Complex, the Special Events team assists with the booking of space in Rudder Theatre Complex, which includes Rudder Auditorium, Rudder Theatre, Rudder Forum, and the Exhibit Hall. Additionally, our Special Events team provides AV technical support, event setup and support, equipment rental and event consultation for events held outside of UCEN facilities.

- University Center Guest Suites – located in the Memorial Student Center (MSC), the University Center Guest Suites are an ideal and convenient place for housing speakers, visitors, and out-of-town guests. With an offering of 800 square feet, each suite includes a living room, kitchenette, king bedroom, full bath and vanity. Individually decorated, each suite welcomes guests with tailored amenities, exemplary service and an experience which embraces university traditions and values.

Vice President for Student Affairs
http://studentaffairs.tamu.edu

- In support of the Texas A&M University mission, the Division of Student Affairs contributes to student learning and development.
The Division provides exceptional services, facilities, and programs that promote student success, embody the Aggie spirit, and foster a diverse and inclusive campus community to deepen the understanding and individual application of the Aggie Core Values - Loyalty, Integrity, Excellence, Leadership, Selfless Service and Respect.
Tuition, Fees and Other Financial Information

General Information

Educational expenses for nine months will vary according to personal needs and course of study. The Financial Aid Office’s basic budget for new undergraduate students including tuition and fees, books, supplies, transportation, on-campus room and board, incidental and living expenses comes to about $24,024. Total expenses for returning students during an academic year should be slightly less than those for new students. The cost for new nonresident or international students is about $43,144. All tuition and fee amounts provided herein represent the most accurate figures available at the time of publication and are subject to change without notice. University Rules in place at the time of publishing are reflected here. All are subject to change. The most current information available will be maintained on the Scholarship and Financial Aid (http://financialaid.tamu.edu) website. Student Business Services online tuition and fee estimate calculator can be found at the Student Business Services (http://sbs.tamu.edu) website.

Payment of Tuition and Fees

Students must meet all financial obligations to the University by their due dates to avoid late penalties. Failure to pay amounts owed may result in cancellation of the student’s registration and their being barred from future enrollment and receiving official transcripts. State law requires that tuition and fees be paid prior to the first day of classes. Students who wish to pay fees in installments can select the option on the My Finances tab on the Howdy (http://howdy.tamu.edu) Portal.

Tuition Rebates After Graduation

Certain undergraduate students who attempt no more than three hours in excess of the minimum number of semester credit hours required to complete the degree under the catalog under which they were graduated may be entitled to a $1,000 tuition rebate after graduation. Several conditions apply and students must meet all of the specified criteria. If you wish to try and qualify for this program, please see the Office of the Registrar (http://registrar.tamu.edu) website for a complete set of student and institutional responsibilities and other criteria.

Obligation to Pay Tuition, Required Fees, Other Fees and Charges for Optional Services

By registering for classes, students agree to pay all tuition and required fees associated with their registration, optional services and other fees, whether paying in full or utilizing the installment payment option. Failure to pay tuition, fees and other charges may result in penalties, late registration fees and/or possible cancellation.

Financial Obligation for Graduating Students

According to Texas A&M University Student Rules and Chapter § 54.007 (c) of the Texas Education Code, all financial obligations to the University must be paid by the end of the semester. Failure to settle all financial obligations will result in withholding a student’s diploma at graduation. Additionally, a block will be placed on the student’s account which will prohibit registration in subsequent semesters and receipt of official transcripts.

Citations

• Section 14.15 of the Texas A&M University Student Rules states “The student must have settled all financial obligations to the University.”

• Chapter § 54.007 (c) of the Texas Education Code states “A student who fails to make payment prior to the end of the semester may be denied credit for the work done that semester.”

Scholarships, Grants and Loans

All financial aid or loans must be accepted and requirements completed before it can be applied toward a student’s account.

Payment Methods

Texas A&M utilizes online statements and electronic payments in its efforts to provide timely financial information to students and to control costs. Student account payment options include:

Electronic/Online

Students can view their account and make online payments using E-Checks, American Express, Discover Card or MasterCard by selecting “Pay Bill/Manage Account” on the My Finances tab in the Howdy portal. Payments made with credit cards will incur a convenience fee charged at the time of payment. Payments made with credit cards will incur a 2.25% convenience fee minimum charge of $3.00. Additional forms of payment accepted include: personal check, cashier’s check, wire transfer and Pin Debit. (Please Note: Once online payment transaction has occurred, the Convenience Fee is non-refundable).

Paper

• Checks – Students may still use paper checks for payments. The University reserves the right to utilize check conversion technology to convert paper checks into electronic format.

• Cashier’s checks

• Money orders

Cash

• Cash is not accepted.

Any payment that is rejected for payment by the paying bank, credit card company or other financial institution is subject to returned item charges of $30 or more. Rejected payments may also result in cancellation of the student’s registration and additional late registration penalties if the student is required to re-register on or after the first day of classes.

Installments

Tuition, required fees, room, board and parking are payable in full, or in installments. A $15 per semester service charge, to cover the cost of handling, will be assessed to each student who chooses to use the installment plan. Students may pay their account in full any time during a semester; however, the service fee will not be refunded once a payment is made under the installment plan. See the Student Business Services (http://sbs.tamu.edu) website for information on installment plans.
Penalties and Late Registration Fees

Late Payment Penalty

There are severe penalties for failure to pay student account balances and installments by their specified due dates. If a payment is delinquent when a semester ends, the student will be blocked and may not receive credit for academic work performed. Students will not be readmitted to the University until all past due balances, including late charges, are paid. A late fee of $25 for A&M students and $50 for HSC students will be assessed for each payment not received on or before it is due. If a student is removed from the rolls of the University or is withdrawn for failure to pay amounts owed the University, a reinstatement fee of $50 for A&M students and $150 for HSC students will be assessed in addition to any other late fees or penalties already incurred and must be paid before the student will be reinstated. Current due dates can be found online at the Student Business Services website.

Late Registration Fees

Students who register on or after the first day of classes are assessed a late registration fee of $100 for A&M students and $200 for HSC students. Students who register after the official census date (12th class day for fall or spring and 4th class day for summer) are assessed a late registration fee of $200 for A&M students and $250 for HSC students. Students who add classes after the official census date are assessed a late add fee of $50 for A&M students and $100 for HSC students. Note: Penalties, late registration and late add fees also apply to students who are required to reenroll because their registrations were canceled for nonpayment. Registrations are subject to cancellation and/or financial penalties if sufficient payment is not received before 5:00 p.m. on the last business day before classes begin.

Use of Collection Agencies and Credit Bureau

If amounts become past due, the University reserves the right to report the account to the Credit Bureau. This will also initiate internal collection efforts and could cause the University to employ an outside collection agency to recover the debt. If any collection efforts must be made, the student will be required to pay all collection costs, including collection agency fees, legal fees and other costs incurred in collecting the amounts due.

Cancelling Registration

Once students have registered for classes, they must select one course of action from the following to remain in good standing with the University:

- pay all amounts due by the specified due date;
- use the online registration to drop all classes prior to the first day of classes; or
- contact the Dean’s office of their college to begin the withdrawal process from the University after the first day of classes; then contact the Registrar’s Office at (979) 845-7117 and request that their registration be canceled.

Following this procedure is especially important for students who have been awarded scholarships or financial aid since the aid may automatically pay tuition and fees and cause the registration to be held even though the student has decided not to attend. Failure to request cancellation of an unwanted registration may result in grades of F or I in all courses for the semester. The student will be required to reimburse the University for scholarships and other financial aid applied to his or her account and will be held responsible for paying all fees for the semester, regardless of whether he or she attended classes.

Cancellation for Nonpayment of Tuition or Fees

The University reserves the right to cancel registrations not paid by their due date, or the official census date for a semester or summer term, to comply with state laws requiring payment of tuition and fees, to free the classroom spaces for other students, and to ensure the most efficient use of university resources.

Texas A&M Tuition and Required Fees

All rates are the most current available at the time of printing and are subject to change. Please refer to the Student Business Services website for the latest tuition and fee information.

Nonresident Tuition Exemption

If you have any questions concerning your eligibility for exemption from nonresident tuition, you may contact the Student Accounts and Billing Services Office at (979) 847-3337 or by email at sbs@tamu.edu.

College/Department Differential Tuition

<table>
<thead>
<tr>
<th>College/Department</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>College of Agriculture</td>
<td>$18.96 SCH</td>
</tr>
<tr>
<td>College of Architecture</td>
<td>$63.21 SCH</td>
</tr>
<tr>
<td>Biological and Agricultural Engineering (Majors, BAEN and AGSM)</td>
<td>$54.08 SCH</td>
</tr>
<tr>
<td>Mays Business School</td>
<td>$43.06 SCH</td>
</tr>
<tr>
<td>College of Education</td>
<td>$28.35 SCH</td>
</tr>
<tr>
<td>Education - Upper Division Teacher Preparation Programs</td>
<td>$300 Sem</td>
</tr>
<tr>
<td>College of Engineering</td>
<td>$68.74 SCH</td>
</tr>
<tr>
<td>College of Geosciences</td>
<td>$9.95 SCH</td>
</tr>
<tr>
<td>College of Liberal Arts</td>
<td>$7.46 SCH</td>
</tr>
<tr>
<td>Veterinary Medicine</td>
<td>$9.92 SCH</td>
</tr>
<tr>
<td>Veterinary Medicine Professional V1-V4</td>
<td>$3850 Sem</td>
</tr>
<tr>
<td>College of Science</td>
<td>$8.87 SCH</td>
</tr>
</tbody>
</table>

University Advancement Fee

The University Advancement Fee is a required fee charged to all Texas A&M University students. It is assessed at a rate of $240.02 for the first hour plus $83.27 per additional hour ($156.75 added for the first hour.) The University Advancement Fee funds services such as advising, the Career Center, University Writing Center, technology and libraries as well as administrative services such as ID services, the campus bus system, billing and refunds, access for students to discounted software and many of the services provided through the Division of Student Affairs.

Distance Education Administration Fee

This $30 per semester credit hour administrative fee is assessed to Non-Funded Out-of-State students taking distance education courses.
Tuition, Fees and Other Financial Information

**Distance Education Differential Tuition**

The rate to be charged for distance education courses will range from a minimum of $40/SCH to a maximum of $550/SCH. Each academic department will have an individual rate that will be approved annually by the President of Texas A&M University. The following are the initial rates (only departments above the $40 minimum rate are listed):

<table>
<thead>
<tr>
<th>Department</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td></td>
</tr>
<tr>
<td>Agricultural Economics</td>
<td>$125</td>
</tr>
<tr>
<td>Agricultural Leadership, Education, and Communications</td>
<td>$99</td>
</tr>
<tr>
<td>Entomology</td>
<td>$150</td>
</tr>
<tr>
<td>Ecosystem Science and Management</td>
<td>$60</td>
</tr>
<tr>
<td>Nutrition and Food Science</td>
<td>$200</td>
</tr>
<tr>
<td>Poutry Science</td>
<td>$181</td>
</tr>
<tr>
<td>Recreation, Park and Tourism Sciences</td>
<td>$262</td>
</tr>
<tr>
<td>Soil and Crop Sciences</td>
<td>$41</td>
</tr>
<tr>
<td>Wildlife and Fisheries Sciences</td>
<td>$125</td>
</tr>
<tr>
<td>Architecture</td>
<td>$250</td>
</tr>
<tr>
<td>Construction Science</td>
<td>$250</td>
</tr>
<tr>
<td>Landscape Architecture and Urban Planning – Undergraduate</td>
<td>$150</td>
</tr>
<tr>
<td>Landscape Architecture and Urban Planning – Graduate</td>
<td>$320</td>
</tr>
<tr>
<td>Visualization</td>
<td>$249</td>
</tr>
<tr>
<td>Business</td>
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<tr>
<td>Finance</td>
<td>$454</td>
</tr>
<tr>
<td>Management</td>
<td>$300.25</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Educational Administration and Human Resource Development</td>
<td>$133</td>
</tr>
<tr>
<td>Educational Psychology</td>
<td>$153</td>
</tr>
<tr>
<td>Health and Kinesiology</td>
<td>$144</td>
</tr>
<tr>
<td>Teaching, Learning and Culture</td>
<td>$137</td>
</tr>
<tr>
<td>Engineering</td>
<td></td>
</tr>
<tr>
<td>Engineering Technology and Industrial Distribution</td>
<td>$125</td>
</tr>
<tr>
<td>Industrial and Systems Engineering</td>
<td>$540</td>
</tr>
<tr>
<td>Petroleum Engineering</td>
<td>$540</td>
</tr>
<tr>
<td>Safety Engineering</td>
<td>$540</td>
</tr>
<tr>
<td>Bush School</td>
<td></td>
</tr>
<tr>
<td>Bush School</td>
<td>$503</td>
</tr>
<tr>
<td>Science</td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td>$53</td>
</tr>
<tr>
<td>Statistics</td>
<td>$69</td>
</tr>
</tbody>
</table>

**Field Trip Fees**

Field trip fees are assessed to cover the cost of providing trips and vary depending on the course taken and expected expenses.

**Health Center Fee**

This $72.50 per semester fee ($25 for a 5-week summer term and $72.50 for a 10-week summer term) is required of all students for the purpose of operating, maintaining and equipping the University Health Center and entitles the student to its services. These services do not include surgical operations or charges for consultations with outside physicians.

**Identification Card (Aggie Card)**

Every student is required to have a student ID card. ID cards are permanent and students are responsible for maintaining a working ID throughout their career at the University. The Aggie Card is used for residence hall access, registration, fee collection, financial aid disbursement, dining halls, athletic event and recreational sports admittance and library privileges. Replacement ID cards are $12. Students who lose their IDs can report the loss immediately and deactivate their card online at [http://myaggiecard.tamu.edu](http://myaggiecard.tamu.edu) or by contacting:

Student Business Services
Aggie Card Office, General Services Complex
(979) 845-4661
8 a.m.–5 p.m., Monday through Friday

**International Student Orientation Fee**

This $35 fee is a one-time fee charged to cover the cost of orientation programming for international students during their first semester of enrollment.

**International Student Services Fee**

This $46 fee ($23 for a 5 week summer term and $46 for a 10 week-semester) is required of all students who are not U.S. citizens or Lawful Permanent Residents to offset the cost of specialized services International Student Services or the English Language Institute provides to these students, such as immigration advising, certificate of eligibility document issuance (I-20/DS-2019), verification and monitoring of legal status, status changes, extensions of legal status, approve or help with the approval of on and off campus work authorizations, social/academic adjustment, administration of special scholarships and programs for these students.

**Laboratory Fees**

The University is required to assess and collect a laboratory fee not to exceed $30 for each laboratory course to cover in general the cost of laboratory materials and supplies used by a student.

**Late Penalties**

Students who fail to pay fees and installments when due are assessed a late payment fee for each payment or installment paid late.

**Late Registration/Add Penalties**

- Students who register on or after the first day of classes, but before the 13th day of classes are assessed a $100 late registration fee.
- Students who register after the 12th class day are assessed a $200 late registration penalty.
- Students who add classes after the 12th class day that result in a net increase in hours enrolled are assessed a $50 late add fee.
Recreational Sports Fee
This $106 per semester fee ($53 for a 5-week summer term and $106 for a 10-week summer semester) is assessed to all students attending the University for use of the Student Recreation Center.

Reinstatement Fee
Students who fail to pay all fees by the last day of the semester will be administratively withdrawn from the University and charged a $50 reinstatement fee.

Student Center Complex Fee
This $100 fee ($50 for a 5-week summer term and $100 for a 10-week summer semester) is required of all students for operating, maintaining, improving and equipping the Student Center Complex.

Supplementary Fee for Courses Attempted More than Twice
A non-repeatable course that is attempted by a student more than twice at a public institution of higher education in Texas may not be reported for state funding. As a result, the institution must either pass the non-funded portion to all students, or charge a supplementary fee to the student who is attempting the course more than twice. Texas A&M has chosen to assess a supplementary fee to those students attempting a course more than twice.

A student attempting non-repeatable courses more than twice at Texas A&M University will be subject to a supplementary fee of $125 per semester credit hour ($375 for a 3 hour course) for the repeated course, in addition to tuition and required fees associated with the course. The general criteria for determining which courses are subject to the supplementary fee are:

• A course is subject to the fee if a student has completed it twice at Texas A&M University with a grade of A, B, C, D, F, F* (academic dishonesty), S (satisfactory), U (unsatisfactory), I (incomplete), Q (authorized drop after the add/drop period) or X (no grade submitted).
• Courses identified by the University as repeatable for credit are not subject to the fee. A schedule of repeatable courses can be found at this website (http://registrar.tamu.edu/Catalogs,-Policies-Procedures/State-Policies/Three-Peat).
• Courses dropped with no record (NR), no grade (NG) and withdrawals (W) are not counted as repeated courses.

Students will be notified at the time they register for a course that it has been taken twice at Texas A&M and is subject to the supplementary fee.

HSC Tuition and Required Fees
Texas A&M University Health Science Center tuition and fees are approved by The Texas A&M University System Board of Regents within guidelines established by the Texas Legislature. Fees are subject to change by the Board of Regents.

Additional information regarding the HSC Student Business Services Office and its services may be found online at the Student Business Services website.

HSC Student Business Services may be reached at 979-847-3337 or at sbs@tamu.edu.

Optional Campus Services

Installment Payment Option
Students who choose to pay using the installment plan pay a $15 installment payment service charge per semester (excluding the Summer term.) This charge is non-refundable once a payment has been made.

Aggie Bucks Unlimited
Show your Aggie Pride with the Aggie Bucks Unlimited debit card, designed just for the Texas A&M University community. Cardholders can make purchases everywhere Visa® debit cards are accepted—on campus and worldwide—and access their cash for free at more than 12,000 Wells Fargo® and Wachovia® ATMs, including 15 in Bryan- College Station. Plus, students can use the Aggie Bucks Unlimited debit card for the fastest available access to their financial aid or other refunds from the University when they sign up for Direct Deposit to a Wells Fargo checking or savings account. To get the card, speak to a Wells Fargo Banker at your New Student Conference or visit any of the six banking locations in Bryan-College Station, including the Wells Fargo Service Center in the General Services Complex on campus.

Athletic Events
• All Sports with Football—student tickets for all home sports (for all fall and spring sports) $290.

Campus Dining
For Dining Plan rates, please access the University Dining (http://dining.tamu.edu) website, and click on Dining Plans. Please note that University Dining follows the University Tuition and Fee Adjustment schedule.

Freshmen (classified as U1s with less than 30 hours of college credit when they initially apply to live on campus) will be required to have a minimum dining plan for the full academic year (or remainder of the academic year for those that apply for housing after the beginning of the fall semester).

All Corps of Cadets members are required to have a dining plan, as designated by the Office of the Commandant.

Upperclassmen and students who are not campus residents are not required to purchase a Dining Plan, but the option is available.

All Dining Plans are loaded onto the Student ID card to make access and use easy.

Fees for the selected meal plan will be added to your TAMU student fee, and are separate from housing fees. Any plan purchases or additions made after the ninth week of class cannot be charged to the TAMU student account and must be paid via credit card. Please visit our website for official dates as they may vary each semester based on the academic and billing calendars.

Students have the option to select a Dining Plan that fits their individual needs. Dining Plans are designed to be flexible for an array of lifestyles and appetites. Smaller Dining Plans are available for upperclassmen and students who live off campus. Most Dining Plans include 2 parts—“Meals,” which can be used at the all-you-care-to-eat dining halls, or in select retail locations as a “meal trade.” The second part of the dining plan consists of “Dining Dollars.” These declining balance dollars can be spent like cash or a debit card, and are accepted at all University Dining kiosks, coffee
shops, food courts and dining centers. Each purchase is automatically deducted from the account.

When paying with Dining Dollars, patrons will enjoy a discount on the door rate at both Duncan and Sbisa, the all-you-care-to-eat dining halls on campus.

Dining Dollars roll over from fall to spring with the purchase of a spring dining plan.

Dining Dollars are only accepted on campus, assuring parents and guardians that this money is spent only on food and beverages.

Prices on Dining Plans include tax; please note that Dining Dollars are not the same as Aggie Bucks.

**MSC OPAS Tickets**

Special Discounted Student OPAS tickets are available through the MSC Box office. For more information, please contact MSC OPAS at (979) 845-1661 or visit their website [http://mscopas.org](http://mscopas.org).

**Parking Permit**

All vehicles parked on the Texas A&M University campus are required to display a valid parking permit, unless they are parked in a pay visitor area. Costs of permits are prorated and subject to change. For more information or to purchase a permit, visit [http://transport.tamu.edu](http://transport.tamu.edu).

<table>
<thead>
<tr>
<th>Service</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Lot or West Campus Garage</td>
<td>$283</td>
</tr>
<tr>
<td>Night Permit (only valid 5pm - 6am)</td>
<td>$91</td>
</tr>
<tr>
<td>Garage Non-Reserved Space</td>
<td>$457</td>
</tr>
<tr>
<td>Motorcycle Permit - including mopeds and scooters</td>
<td>$91</td>
</tr>
</tbody>
</table>

**Residence Hall Room Rates**

All students living in residence halls or apartments are required to pay room rent. Rooms are furnished with beds, mattresses, desks, chairs and dressers. Students are expected to furnish their own pillows, blankets and linens. Room rates include heat, air-conditioning, lights and cleaning of common areas. Rates are for the semester and are subject to change.

For more information, please see Residence Life [http://restlife.tamu.edu](http://restlife.tamu.edu).

**Yearbook**

The cost is $81.19 including shipping and sales tax.

**Fees for Other Special Items or Services**

**Application Fees**

Graduate: $50; Undergraduate: $75; International: $90

**Cooperative Education Fee**

A fee of $75 is charged to all participants of the Cooperative Education program.

**Diploma/Graduation Fee**

A non-refundable fee per degree sought is assessed the semester a student applies for graduation. This fee is payable each time a student applies for graduation. A late fee of $50, in addition to the diploma/graduation fee, may be charged to those who apply for graduation after the published deadline.

**International Student Health Insurance**

International students (students who are not U.S. citizens or Lawful Permanent Residents of the United States) who are pursuing their studies at Texas A&M are required to have health insurance. International students will be automatically enrolled in and charged for the Student Health Insurance Plan (SHIP). International students may be eligible to apply for a waiver of the SHIP and provide alternative health insurance coverage that meets the waiver guidelines. Guidelines can be located on the International Student Services webpage. This is to ensure that medical treatment will be available in the event of injury or illness during their studies at the University. This requirement includes students enrolled in extensive English language programs and non-degree seeking programs. Full-time English Language Institute (ELI) students should contact ELI for information about this. All other international students can receive more detailed information about this requirement by visiting the International Student Services website. Specific questions may be directed to International Student Services by emailing healthinsurance@tamu.edu.

**Microfilming, Binding and Collating**

Binding, collating, microfilming theses and dissertations—Masters: $110, Doctoral: $170

**New Student Orientation Fee**

A non-refundable new student orientation fee of $100 is charged to all students. An additional fee of $35 is required of all international students to cover additional costs associated with orientation programs.

**ROTC Uniform Rental**

Qualifying cadets enrolled in Army, Air Force or Naval ROTC will be reimbursed the cost of basic cadet uniforms. Cadets who are not enrolled in ROTC (Drills and Ceremonies Cadets) are required to pay for use of uniforms.

**Sponsored International Students**

An administrative fee not to exceed $500 per semester or summer session (all or part thereof) will be required to support international sponsored students whose programs are coordinated through International Student Services, Sponsored Student Programs, unless these fees are waived as part of negotiated contractual agreements.

**Distance Education and Other Nontraditional Course Offerings**

<table>
<thead>
<tr>
<th>Required Tuition and Fees</th>
<th>DE</th>
<th>IA</th>
<th>CE</th>
<th>GG</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuition</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>University Advancement Fee</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Cooperative No Education Fee</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Distance Learning Fee</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
Residence Hall Deposit

A deposit of $300 and a nonrefundable $50 application fee are required to apply for a room in a residence hall. The deposit will be retained as a deposit against damage or late cancellation or to keep the application on file. A reservation may be canceled and the deposit refunded upon request prior to signing a housing contract. Housing contracts must be signed for the next academic year by May 1st. Any cancellations after May 1st will result in forfeiture of deposit. Additional penalties for later cancellation. The amount of the room deposit and the deposit refund schedule are subject to change per university administration approval.

Freshmen classified as U1 with less than 30 hours will be required to have a dining plan if they live on campus.

Refund Policy

Fee Adjustments for Courses Added and Dropped

A student may drop courses during the first four days of a fall or spring semester. Students also may drop classes with special permission of the dean between the 6th and 12th class days. Full refunds will be given for courses dropped during these periods. Refunds will not be issued for classes dropped after the 12th class day. As of the first day of the semester, students may not drop all of their courses through the drop/add process, but instead must go to the office of their dean to officially withdraw. A student may add courses during the first five days of a fall or spring semester.

Withdrawal from the University

Once a payment for tuition and fees has been accepted by the University, a student is considered officially enrolled unless otherwise restricted from enrollment. Stopping payment on a check for fees or allowing the check to be returned unpaid by the bank for any reason does not constitute withdrawal from the University. Students who wish to drop to zero (0) hours in a semester or term must request an official withdrawal (http://registrar.tamu.edu/Courses,-Registration,-Scheduling/Registration-Enrollment-Information/Withdrawing-From-the-University). This process is initiated by the student online via Howdy (https://howdy.tamu.edu) in the Student Withdrawal channel on the My Record tab. Failure to follow procedures for withdrawing from the University may result in financial penalties, forfeiture of any tuition and fee adjustments (http://sbs.tamu.edu/accounts-billing/tuition-fees/schedule/#REF_WITHDRAW), delays with future enrollment, and course work may be recorded as incomplete or failed. Refund percentages are applied to total fees assessed and not the amount paid. Students who withdraw before paying all installments may, receive a bill with a balance due rather than a refund.

International students must visit with an advisor in the International Student Services Office before withdrawing to determine if doing so will affect their visa status.

Recipients of financial assistance should talk with a Scholarships & Financial Aid advisor before withdrawing. Students receiving funds awarded by Scholarships & Financial Aid should be aware of policies regarding withdrawal from the University. Federal regulations require a return calculation for all students who receive Title IV student assistance at a post-secondary institution of higher education who withdraw during a payment period (semester). The length of time during which a return must be calculated is up to 60 percent of the payment period. Students withdrawing prior to 60 percent of the payment period

Deposits

General Deposit

Every student, unless registered in absentia, must make a property deposit in the amount of $100 to protect the University from damage to or loss of university property. Charges will be billed directly to the student or collected by the department upon reissue of supplies or property. Failure to pay the charges promptly will cause the student to be barred from re-admission and receiving an official transcript from the University. If a student withdraws from the University without paying the charges, the deposit will be held for 30 days after the close of the semester or a student’s withdrawal, so that all charges and fines may be totaled from the various departments. This deposit, less outstanding charges, will be returned upon request to the student graduating or withdrawing from school. Deposits not requested within four years from date of last attendance will be forfeited into a student deposit scholarship account.

1 Distance Education Instruction: This group includes traditional off-campus classes, all university centers and telecommunications, video and other nontraditional Distance Education Instruction delivery models.
2 In Absentia: The traditional student who is performing individual research or completing degree requirements that do not require classroom instruction.
3 Cooperative Registration: Students participating in the Cooperative Education Program at Texas A&M University.
4 Texas A&M University Graduate Students – Galveston: Texas A&M graduate students who enrolled at College Station, but who are taking courses exclusively at Galveston.
5 Study Abroad: Students participating in the Texas A&M University Study Abroad Program.
may be required to return disbursed funds not earned. Additionally, students who do not successfully complete courses for the semester may be considered unofficially withdrawn and may be subject to a return calculation or all disbursed funds being returned if attendance cannot be documented. Eligibility for state and institutional funds may also be impacted by withdrawing from the University. Drops and withdrawals are considered unsuccessfully completed coursework when determining Satisfactory Academic Progress (SAP) (http://financialaid.tamu.edu/Graduate/Maintaining-Eligibility/#1-SAPComponents) and will impact completion rate.

Student athletes should visit their academic advisor in the Department of Athletics before initiating the withdrawal process.

Refund Delivery
Texas A&M and Wells Fargo Bank have joined forces to deliver financial aid and other refunds to students faster through the University’s refund delivery process. You will receive information from Wells Fargo and the University at your new student conference and in your official University email account, which will explain the process for signing up for direct deposit of refunds.

Unclaimed Refunds
According to federal law, the university is required to return Title IV funds that have not been claimed (i.e., refund check that has not been cashed) within 240 days of issue. These funds will be returned to the appropriate federal financial aid program.

Tuition and Fee Adjustments
Tuition and fee adjustments shall be made to students officially withdrawing from the University for charges listed below according to the following refund schedule: Tuition and Required Fees, Residence Hall Rent, and Meal Plans (excluding Aggie Bucks).

Fall and Spring Semester and 10-Week Summer Semester
By 5 p.m. on the last business day before the first day of class 100%
During the first five class days 80%
During the second five class days 70%
During the third five class days 50%
During the fourth five class days 25%
After the fourth five class days None

Summer Term of More Than 5 Weeks But Less Than 10 Weeks
By 5 p.m. on the last business day before the first day of class 100%
During the first, second or third class 80% day
During the fourth, fifth or sixth class 50% day
Seventh day of class and thereafter None

Residence Hall Rent/Deposit
If a student withdraws, moves off campus or in any other way terminates the housing contract, a refund of residence hall rent may be made according to the stipulations in the housing contract. If a student cancels the academic year housing contract during the contract period, the $300 deposit is subject to forfeiture. Any cancellation made 7 days after the student has been assigned, will be subject to 25% of the fall semester’s room rent. Any cancellation for the spring semester not outlined as an exception in the housing contract will be subject to an additional charge equal to 50% of the spring semester’s room rent. Exceptions may be made for students who cancel their contract for the following reasons: co-op or student teaching assignment, academic restriction, graduation and medical withdrawal.

Athletic Refunds
Refunds are not allowed for individual games or games missed. A prorated refund is permitted if the option is used to pick up a ticket for any one game. Once a ticket option has been used, prorated refunds will be given only in the event of withdrawal from the University. For information on refunds, contact the Athletic Business Office at (979) 846-8892.

Department of University Dining—Dining Plan Options Add/Change/Drop Policies
Texas A&M University Dining’s dining plans and options listed are based on information available at time of printing and are subject to change. University Dining follows the University’s refund schedule for Tuition and Fee Adjustments. Refunds are given on the percentage basis listed for students dropping fee options or officially withdrawing from the University.

Students may purchase a dining plan, change to a larger plan or add on to a plan during registration for classes or at any time through University Dining. Dining Plans and additions to the plans may be charged to the student account through the ninth week of school. Any purchases after that point will require a credit card payment. Changes from a higher dining plan to a smaller dining plan or requests to cancel/drop are permitted only through the fourth week of classes. The appropriate fee is to be paid to the Office of Student Business Services.

Dining plans are valid for one semester starting with the first day of campus move-in (as designated by the Department of Residence Life) and end after the last final exam day. Check with Dining for posted dates for dining plan access. Location hours may vary during class breaks and meal availability may exclude official University holidays.

Following University policy, no one is authorized to use or borrow a student’s identification card (Aggie Card); therefore, dining plans are not transferable between students. The Aggie Card must be presented to Dining cashiers for dining plan participation. If an Aggie Card becomes lost, report it immediately by calling (979) 845-4661 or go to http://myaggiecard.tamu.edu to deactivate the card.

For questions and assistance, please email dining@tamu.edu (include name, UIN and instructions if dining plan related) or contact our office at (979) 845-3005. Additional information on University Dining and dining plans can be found on our website (http://dining.tamu.edu) or in this catalog under Campus Dining.

Yearbook
Yearbook charges are refundable in full during the semester in which payment is made. Thereafter, no refunds will be made on orders canceled in subsequent semesters. Yearbooks must be picked up during the academic year in which they are published. Students who will not be on campus when the yearbooks are published must pay a mailing and handling fee. Yearbooks will not be held, nor will they be mailed, without payment of the mailing and handling fee. Refunds will not be made on
Financial aid is awarded on a first-come, first-served basis with a published priority date of March 15, prior to the fall semester for which the student is seeking aid. Financial aid offers are made based on the assumption that students will enroll full-time in the fall and spring semesters. Cost of attendance and awards will be adjusted for students who are enrolled less than full-time at Texas A&M University or through the Texas A&M-Blinn TEAM Programs.

To apply for financial assistance, a student must submit a FAFSA. Students are encouraged to submit their FAFSA online at www.fafsa.ed.gov as soon as possible. Only students who have been accepted for enrollment and whose FAFSA results and other documents requested by Scholarships & Financial Aid are on file and processed will be sent a financial aid offer. Financial aid offers for the following academic year will be sent beginning in mid-March for incoming freshman and beginning in June for other undergraduate students. Summer financial assistance is offered to students with a FAFSA on file who enroll at least half-time in summer coursework at Texas A&M.

Student inquiries may be directed to:

Scholarships & Financial Aid
Texas A&M University
P. O. Box 30016
College Station, TX 77842-3016
(979) 845-3236
financialaid@tamu.edu
http://financialaid.tamu.edu
FAFSA School Code 003632

Please visit our website (http://financialaid.tamu.edu) for the most current information on programs and any associated deadlines.

Grants
The Federal Pell Grant is available to undergraduate students who have not received a baccalaureate degree and have demonstrated financial need as determined by the FAFSA. The Federal Pell Grant provides a foundation of financial assistance to which aid from other sources may be added.

The Federal Supplemental Educational Opportunity Grant (FSEOG), and the Texas Public Education Grant (TPEG) are available to students, provided the results of their financial aid application show evidence of financial need and funds are available. These funds are awarded on a first-come, first-served basis. The Towards EXcellence, Access and Success (TEXAS) grant is available to eligible Texas residents who have requisite levels of financial need according to the FAFSA and have met the remaining program criteria (http://financialaid.tamu.edu/Undergraduate/Types-of-Aid/#0-TEXASGrant); it is also subject to funds availability and eligibility guidelines as defined by the Texas Higher Education Coordinating Board. Additionally, Texas A&M University provides institutional grant aid to eligible students to assist with educational expenses.

Student Part-Time Employment
The Student Employment Office in Scholarships & Financial Aid coordinates student part-time employment, both off- and on-campus in the Bryan/College Station area. Students may visit the online job database. Work Study, assistantships and other part-time positions are posted. Students secure their own employment through job leads provided by Scholarships & Financial Aid or through their own initiative. Employment opportunities are available through the Student Employment Office in Scholarships & Financial Aid.
advising is available to students who have not had previous job seeking experience.

On-campus student employees are paid minimum wage or higher and are paid bi-weekly along with regular University employees. University student employees are not eligible for paid holidays, retirement, vacation, nor sick leave.

Professional development workshops are available for student employees and supervisors of student employees. These free workshops include topics ranging from communication skills to preventing sexual harassment in the workplace and from customer service to workplace etiquette. For more information or to register, please visit the Jobs for Aggies (http://jobsforaggies.tamu.edu) website or call (979) 845-0686.

The Federal/Texas College Work Study Programs

Federal and state programs provide part-time employment for U.S. citizens, permanent residents and eligible non-residents, within fund limitations, who have an established financial need and desire on-campus employment.

To qualify for the Federal/Texas College Work Study Programs, a student must have submitted a financial aid application, have financial need, be eligible to work in the Unites States, be enrolled at least half-time or accepted for enrollment and be making Satisfactory Academic Progress if enrolled.

The Community Service Program allows students who qualify for the Federal Work Study Program to work part-time with participating local non-profit, governmental and community-based organizations. This program is designed to improve the quality of life for community residents, particularly low-income individuals, or to solve problems related to community needs.

The Texas A&M University Reads and Counts program is a partner of the national No Child Left Behind initiative. It is based on the philosophy that children are our nation’s greatest asset. It calls all Americans to support teachers and help ensure that every child can read well by the end of the third grade. Eligible and dedicated college students are called to serve as reading and math tutors, as well as mentors and role models for area elementary and middle school students.

All Work Study students are paid minimum wage or higher, work an average of 20 hours per week, and are not eligible for paid holidays, retirement, vacation, nor sick leave. For more information on Federal/Texas College Work Study, the Community Service Program, or Texas A&M University Reads and Counts, visit the Student Employment Office on the second floor of the Pavilion or the Jobs for Aggies website.

Loan Programs

The Federal Direct Loan Programs are available to students who have submitted a FAFSA. Students will be notified of their eligibility for the Direct Loan program(s) through a financial aid offer. The Texas B-On-Time Loan program is available to Texas residents having completed the recommended or distinguished curriculum from an accredited public or private high school. Application information and/or promissory notes will be furnished with the financial aid offer, if applicable, and as funds are available.

Students and parents seeking the Parent Loan for Undergraduate Students (PLUS) may obtain information from the financial aid (http://financialaid.tamu.edu) website. This program requires the FAFSA to be on file with Scholarships & Financial Aid.

Short-term loans are available to provide assistance to students who experience temporary financial difficulties with educationally related expenses. Funding for this program is provided by The Association of Former Students, the Class of 1926 and other University resources. This program is not intended to provide long-term assistance or to replace other assistance available through Scholarships & Financial Aid. Students must be degree-seeking and enrolled at least half-time to be eligible for short-term loans. The Emergency Tuition and Required Fees loan program is available to help students pay their Texas A&M University tuition and required fees. The loan is applied directly to the student’s tuition and fee account.

Please refer to our website (http://financialaid.tamu.edu) for detailed information on all of the aforementioned programs and more.

Financial Literacy

The Money Wise Aggie, Texas A&M University’s personal finance advising and educational program, is designed to help students make smart personal finance decisions while pursuing their academic degrees and to lay a foundation for financial success throughout life.

The Money Wise Aggie is a free service to students that provides personal advising and presentations in the following areas:

- Money Management
- Credit Cards and Credit Scores
- Premarital Money Discussions
- Financial Challenges After College
- Debt Reduction Strategies
- Identity Theft
- Financial Aid
- Student Loan Repayment
- Saving and Investing
- Major Purchases (Cars and Homes)

Advisors participating in The Money Wise Aggie program are financial aid advisors who have been awarded the Accredited Financial Counselor™ or Certified Financial Planner™ designations. Each advisor provides objective, unbiased advice to help students make informed decisions about their finances. Advisors also provide scheduled presentations on-campus throughout the semester, as well as presentations to organizations upon request. Individual student advising is available by appointment. For more information, please visit the Money Wise Aggie website.

Scholarships

College/Departmental Level Scholarships

A number of colleges and departments at the University award scholarships on a merit basis to incoming freshmen interested in particular major fields of study. The value of the awards vary, and the term of scholarships range from one to four years. Selection criteria are determined by each awarding college and department based upon predetermined criteria. Completed scholarship applications must be received no later than specified deadlines. Awards are announced mid-spring for the following academic year.
Valedictorians

Highest ranking graduates from Texas high schools accredited by the Texas Education Agency are entitled to a tuition exemption during their freshman year at Texas A&M. To receive this award, the student must be certified as the highest ranking graduate and Texas A&M must be the first college or university of full-time enrollment. No formal application is required. Qualified students must present their official Texas Education Agency Highest Ranking High School Graduate declaration to Scholarships & Financial Aid at Texas A&M during the new student conferences or at the beginning of the fall semester.

Incoming Freshmen Scholarship Programs

The Opportunity Awards are awarded to first year freshmen based on academic achievement, leadership ability, extracurricular participation, and, in some cases, financial need. In addition to scholarships offered through the Scholarships & Financial Aid office, many colleges, departments, the Corps of Cadets, and the Texas A&M Foundation utilize the ApplyTexas (http://www.applytexas.org) freshmen scholarship application. In order to be considered, students must complete and submit this no later than December 1 of their senior year of high school.

The Achievement Scholarships are available to incoming freshmen who attended and graduated from targeted high schools in the State of Texas. Scholarships include the Academic Achievement Scholarship, President's Achievement Scholarship, Challenge Scholarship, and Century Scholarship. These high schools are designated as House Bill 400 schools, Engineering E12 schools, Early College High Schools, and Century Scholar Program Schools. Awards are based on academic achievement, leadership ability, and extracurricular participation. To be considered, students must complete and submit the ApplyTexas (http://www.applytexas.org) freshmen scholarship application no later than December 1 of their senior year of high school.

The Endowed Scholarships are available to incoming freshmen who meet the criteria of a 1300 SAT (Critical Reading and Math with at least a 600 on each) or a 30 ACT (composite with a minimum of 27 English and 27 Math). Scholarships include President's Endowed Scholarship, Lechner Scholarship, and McFadden Scholarship. Awards are based on academic achievement, leadership ability, and extracurricular participation. To be considered, students must complete and submit the ApplyTexas (http://www.applytexas.org) freshmen scholarship application no later than December 1 of their senior year of high school.

The Terry Foundation Scholarship is also administered through the Incoming Freshman Scholarship Program. It is available to students from the state of Texas. It requires three essays and three letters of recommendation. Awards are typically made to fund the cost of attendance; these are four year awards.

The Regents' Scholars Program is an institutional scholarship for eligible low-income, first generation college students. The scholarship is based on the results of the FAFSA and is awarded to entering freshmen for four years.

Continuing Student Scholarships

The Continuing Student Excellence Award application is available to students with at least one semester completed at Texas A&M. Awards range in value from $500 to $1,500 and are available to undergraduate, graduate, and professional students currently enrolled at Texas A&M. Some awards are limited to certain fields of study and to individuals who have attained a necessary academic classification, while others are unrestricted. Awards are made to outstanding students based on a combination of academic achievement, campus/community involvement, campus leadership roles, and, for some scholarships, financial need. In addition to scholarships offered through the Scholarships & Financial Aid office, many colleges, departments, the Corps of Cadets, and the Texas A&M Foundation use the Continuing Student Academic Excellence application for award consideration. Students are encouraged to complete the Continuing Student Scholarship Application, beginning in October via the scholarships website. The deadline for submitting applications is February 1, prior to the academic year for which the student will be awarded.

Transfer Student Scholarships

Aggie Transfer Student scholarships are designed to recognize outstanding students who will be transferring to Texas A&M University, both for domestic transfer students and for international transfer students. Scholarships are awarded based on a combination of academic achievement, extracurricular activities, campus involvement at their current institution, leadership, major and, in some instances, financial need. These award amounts can range from $500 to $3,000 and the application is available to students through the ApplyTexas (http://www.applytexas.org) application. In addition to scholarships offered through the Scholarships & Financial Aid office, many colleges, departments, the Corps of Cadets, and the Texas A&M Foundation use the ApplyTexas transfer scholarship application for award consideration. For more details, visit our website.

The Terry Foundation Transfer Scholarship is administered through the Aggie Transfer Scholarship Program. It is available to incoming transfer students in the fall. It requires letters of recommendations and essays. Awards are made by the Terry Foundation; these are two- to three-year awards.

Scholarship Recipients and Non-Resident Tuition Waivers

A student who is awarded a competitive University scholarship of at least $1,000 for the academic year or summer for which the student is enrolled and who is either a nonresident or a citizen of a country other than the United States of America may be entitled to pay the fees and charges required of Texas residents without regard to the length of time the student has resided in Texas. This scholarship must be awarded by a scholarship committee officially recognized by the Texas A&M University administration, and each waiver must be approved. For applicable recipients, selective service registration is required.

Miscellaneous Scholarship Information

Students are encouraged to contact their college and major department for additional scholarship opportunities. Most major libraries own scholarship information books. Additionally, Scholarships & Financial Aid has information regarding scholarship resources available online.

Address requests for additional information to:

Texas A&M University
Scholarships & Financial Aid
P. O. Box 30016
College Station, TX 77842-3016
(979) 845-3236
scholarships@tamu.edu
http://scholarships.tamu.edu
University Policies

Admission Statement and Policy on Individuals with Disabling Conditions

Texas A&M University has a strong institutional commitment to the principle of diversity in all areas. In that spirit, admission to Texas A&M University and any of its sponsored programs is open to all qualified individuals. Texas A&M does not discriminate on the basis of an individual's disability and complies with Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act (ADA) as amended in its admissions, accessibility, treatment and employment of students in its programs and activities.

Texas A&M provides academic accommodations and auxiliary aids to students with disabling conditions, as defined under the law, who are otherwise qualified to meet the institution's academic requirements.

Students with disabilities who would like to request accommodations may contact the following based on your location:

- Texas A&M College Station campus, College of Nursing and School of Public Health should contact Disability Services (979) 845-1637.
- Baylor College of Dentistry should contact the Office of Academic Affairs (214) 828-8207.

Students with a disability who believe they have experienced discrimination may contact the following based on your location:

- Texas A&M University College Station campus or the School of Law should contact the ADA Coordinator at (979) 862-7737 or ADA.Coordinator@tamu.edu.
- Texas A&M Baylor College of Dentistry (HSC), College of Nursing (HSC), and School of Public Health (HSC) should contact the ADA Coordinator at (979) 436-9207 or ADA.Coordinator@tamhsc.edu.

Statement on Harassment and Discrimination

Texas A&M University provides equal opportunity to all employees, students, applicants for employment or admission, and the public regardless of race, color, religion, sex, national origin, disability, age, genetic information or veteran status. Texas A&M University will promptly investigate all complaints of discrimination, sexual harassment, and related retaliation in accordance with applicable federal and state laws. Furthermore, we aspire to maintain a work and educational environment free from discrimination on the basis of sexual orientation, gender identity or gender expression.

Faculty, staff and students should be aware that any form of harassment and any form of illegal discrimination against any individual is inconsistent with the values and ideals of the University community.

Students who have questions or believe they have experienced discrimination or harassment are encouraged to contact:

- Texas A&M College Station campus contacts - Notice of Nondiscrimination and Abuse (http://urc.tamu.edu/media/642261/NoticeOfNonDiscrimination.pdf)
- Texas A&M Baylor College of Dentistry (HSC), College of Nursing (HSC) and School of Public Health (HSC) contacts - Notice of
International Opportunities for Students

Student Options Abroad

Study Abroad Programs Office

http://studyabroad.tamu.edu

Texas A&M University is committed to providing access to high impact international opportunities for all students. The ability to engage successfully across cultures and the development of international leadership skills are crucial for success as graduates enter the work force and commit to lifelong learning.

The Study Abroad Programs Office provides access for all Texas A&M students to a broad range of high impact international experiences. Last year, over 4,000 students participated in academic, volunteer, service learning and research opportunities in 96 different countries. The Study Abroad Programs Office also contributes to the development of on-campus experiences that foster cultural awareness, including the Academy for Future International Leaders.

Conducting Research Abroad

Texas A&M University faculty engage in research in many foreign countries. Students who join faculty on research programs overseas, or who develop independent research opportunities, should register with the Study Abroad Programs Office to ensure emergency assistance as needed while abroad. Several other research options include the following:

• Fellows Program – MSC L.T. Jordan Institute for International Awareness (http://ljordan.tamu.edu/fellows)
• Honors and Undergraduate Research (http://honors.tamu.edu/research)
• Sconvcroft Institute of International Affairs (http://bush.tamu.edu/sconvcroft)

Internships/Work Abroad Options

Students have a variety of options for credit or non-credit work or internships abroad. In all such cases, students should register their work abroad experiences with the Study Abroad Programs Office to ensure emergency assistance as needed while abroad.

• Internship and Living Abroad Programs – MSC L.T. Jordan Institute for International Awareness (http://ljordan.tamu.edu/ilap)
• Public Policy Internship Program (http://ppip.tamu.edu)

University Locations Abroad

Many Texas A&M partner organizations offer international opportunities to students. Students can check the Study Abroad Programs Office search engine to locate such experiences or contact their academic departments about programs and locations they recommend. In addition, Texas A&M has a research and education center in Costa Rica.

The Soltis Center for Research and Education in Costa Rica

http://soltiscentercostarica.tamu.edu

The Soltis Center for Research and Education in north-central Costa Rica was established in January 2009 to support research, education and outreach in Costa Rica and throughout Central America. The Center is located in San Juan de San Isidro de Peñas Blancas, about three hours northwest of San Jose. The modern facilities of the Center include dorms, a cafeteria, wet and dry labs, classrooms, a videoconference room and multiple use areas. The Center provides students and faculty with access to more than 250 acres of primary and second growth forests with an experimental watershed complete with a meteorological station, a canopy tower and weir dam. The Center is adjacent to more than 50,000 hectares of protected forest in the Children’s Eternal Rainforest and the Monteverde Conservation Area. The Zona Protectora Arenal-Monteverde extends to the Center through a forest corridor that descends in elevation from 1,800 meters at Monteverde to 450 meters above sea level at the Center. This natural reserve has four major tropical life zones and includes more than 3,000 species of vascular plants and more than 400 species of resident and migratory birds. At the regional level, the Center is located in the heart of the Peñas Blancas River Watershed, which extends over 40,000 hectares that transition from rainforest in the highlands to pastures and agricultural crops below the Center. The unique physical and cultural setting of the center provides students and faculty with research and educational opportunities in tropical ecology, civil engineering, ecosystem sciences, geosciences, public and rural health and agricultural economics.

On Campus Engagement in International Opportunities

Students don’t have to go abroad to take advantage of international opportunities offered by Texas A&M. Students who remain on campus are encouraged to participate in many options available including the following:

• Academic certificates and minors with an international focus (http://studyabroad.tamu.edu)
• Academy for Future International Leaders (http://afil.tamu.edu)
• Center for International Business Studies (http://cibs.tamu.edu)
• Confucius Institute at Texas A&M University (http://confucius.tamu.edu)
• Corps Global Leadership Initiatives (http://corps.tamu.edu/global)
• MSC L.T. Jordan Institute for International Awareness (http://ljordan.tamu.edu)
• Norman Borlaug Institute for International Agriculture (http://borlaug.tamu.edu)
• SCONA (http://scona.tamu.edu)
• Sconvcroft Institute of International Affairs (http://bush.tamu.edu/sconvcroft)
• Student Organizations (http://studentactivities.tamu.edu/app/organization)
  • (To find internationally focused student organizations, please visit http://studentactivities.tamu.edu/app/search/index and search international.)

Students should consult their department and college advisers for additional opportunities to engage in global education on or off campus.
Honors and Undergraduate Research

Honors and Undergraduate Research provides high-impact educational experiences and challenges motivated students in all academic disciplines to graduate from an enriched, demanding curriculum. The programs administered by the office bring together outstanding students and faculty to build a community of knowledge-producers, life-long learners, nationally recognized scholars and world citizens. Through Honors and Undergraduate Research, motivated students have access to Honors courses, co-curricular enrichment activities and research programs that can be customized to enhance each student’s personal, professional and intellectual development.

Undergraduate Research

Honors and Undergraduate Research promotes, coordinates, creates and assesses undergraduate programs involving creative scholarship, inquiry and research in all academic disciplines at Texas A&M. As a recognized “high impact practice,” undergraduate research experiences increase undergraduate student learning and success, not only while students are at Texas A&M, but long after graduation.

In terms of professional and intellectual development, being involved in undergraduate research allows students to learn more about their future professional field, to participate in a scholarly community of like-minded students and to develop a close working relationship with acclaimed faculty. Research experiences make students more competitive for scholarships, internships, jobs, international opportunities and admission to top graduate and professional programs. Perhaps most importantly, engaging in undergraduate research allows students to experience the excitement of creating new knowledge, solving cutting-edge problems and developing new insights—life skills that are increasingly important in our world.

Campus-wide programs coordinated by Honors and Undergraduate Research include the Undergraduate Research Scholars program and the publication of Explorations: the Texas A&M Undergraduate Journal. The office offers workshops for students on obtaining summer research opportunities, starting out in research and thesis writing, as well as workshops for faculty and graduate students on mentoring undergraduate researchers. Honors and Undergraduate Research also works with groups across campus to promote and facilitate activities that support undergraduate research opportunities, such as summer Research Experience for Undergraduate (REU) programs and the HUR-Sigma Xi Research Expo. Lastly, the office provides assistance for developing externally funded proposals and implementation of funded projects that have undergraduate research involvement, such as National Science Foundation REU, Beckman Scholars, and Howard Hughes Medical Institute Education grants.

Undergraduate Research Scholars Program

Any junior or senior student with a cumulative Texas A&M GPR of 3.0 or above may apply to the Undergraduate Research Scholars program. In addition, groups of at least two to four students collaborating as a team on a single project may also apply. The Research Scholars program requires two long semesters of independent research supervised by a faculty advisor that culminate in a scholarly product. The scholarly product may be a research thesis, an accepted article in a professional journal, an exhibit, a performance, or other product as determined by the faculty advisor in collaboration with the Honors and Undergraduate Research Office. Participants are selected for this program based on the quality of their project proposal and their academic record.

Explorations: The Texas A&M Undergraduate Journal

Explorations is a student-run journal guided by faculty and administrators that selects and publishes student-authored articles of general interest in any area. Articles are submitted in a two-stage process: first, proposals for articles are reviewed by faculty-student teams; secondly, the resulting full-length articles undergo a second round of peer review. Acceptance to the journal is competitive—less than 20% of submitted proposals are accepted. Recently published articles have been from a wide range of academic fields: music, creative poetry, forensics, cancer biology, astrophysics, nanomedicine, computer algorithms, business, geosciences, sociology, aerospace engineering and cultural anthropology. To review recent issues and to find upcoming submission deadlines, visit the Honors and Undergraduate Research website.

Undergraduate Research Ambassadors

Undergraduate Research Ambassadors represent Honors and Undergraduate Research at research, recruiting, and outreach events. Juniors or seniors with an extensive background in research, a GPR of 3.0 or higher, outstanding oral communication skills and the ability to describe research to a general audience may apply to the program. A dozen Ambassadors from multiple disciplines are chosen each year, trained in presentation and leadership, and then participate in a variety of activities including meeting with highly placed members of the University Administration, distinguished faculty, outstanding alumni, prospective students, and parents.

Workshops and Events

Honors and Undergraduate Research offers informational workshops on undergraduate research for undergraduate students, graduate students, and faculty. Additionally, we coordinate numerous public events that celebrate and promote undergraduate research, providing venues for students to present their research projects, for faculty to recruit new student researchers, and for recognition of the research efforts of both students and faculty. Workshops and events are publicized through emails, newsletters, and the Honors and Undergraduate Research (http://hur.tamu.edu) website.

Grant, Proposal, and Project Assistance

Honors and Undergraduate Research provides faculty with a wide variety of support services for undergraduate research program and proposal development and implementation. Please contact the office directly for more information.

Other Capstones

Honors and Undergraduate Research offers additional one year Capstone experiences to any Junior or Senior with a cumulative Texas A&M GPR of 3.0 or above. The Undergraduate Teacher Scholars Program allows Scholars to create their own Honors seminar or to improve an existing course in collaboration with a faculty expert. The Undergraduate Service Scholars Program pairs students with community leaders to develop and carry out projects that benefit the greater community.
Undergraduate Leadership Scholars Program enables student leaders in various organizations to hone their skills as they plan and implement improvements to their organization’s programming and impact in collaboration with their faculty advisor. All participants for these programs are chosen based on the quality of their proposals, their academic record and the recommendation of their faculty or community advisor.

Admission to the University Honors Program

The university-level Honors distinction offered by the University Honors Program is Honors Fellows. Students are admitted to the Honors Fellows curriculum on a competitive basis. Incoming freshmen apply as part of their application for admission to the university. Continuing students may apply each Spring for entry in the Fall prior to completing 60 credit hours at Texas A&M.

Applications are evaluated on the basis of the student’s record of academic achievement and demonstrated potential for creativity, intellectual ability, imagination, curiosity, willingness to try new things and self-awareness. Once admitted to the Honors Fellows curriculum, students are designated as “Honors Students” and may then access specific privileges and resources, including additional academic advising, priority registration, contracting non-honors courses for Honors credit, Honors Independent Study and enrolling in graduate-level courses for undergraduate Honors credit. Honors Students also receive priority for the Honors Housing Community and advising for competitive national fellowships.

Freshmen admitted to the University Honors Program are required to live in the Honors Housing Community and participate in the Honors Freshman Learning Community course. To remain in the program, all students (freshman and continuing students) must make progress toward the Honors Fellows distinction and meet minimum co-curricular participation requirements. See the section on Maintaining Honors Status (p. 93).

Honors Fellows Curriculum

The Honors Fellows curriculum requires 30 credit hours of honors coursework (including 9 credit hours from the University Core Curriculum and 12 credit hours of upper-level coursework) and a “capstone experience.” The University Honors Program works with academic departments across the university to ensure that appropriate Honors courses are offered. Honors courses have limited enrollment and encourage participatory learning. In Honors classrooms, students work closely with many of the University’s most acclaimed faculty. Material in Honors courses is intended to provide increased complexity, not simply more work or greater difficulty. Small class size (usually not more than 25 students) also allows Honors courses to undertake activities and utilize facilities not readily available to undergraduate students. Honors courses may be special sections of regularly offered courses or courses developed specifically for Honors Students. Students are encouraged to visit regularly with University Honors Program advisors to ensure that their course selection meets both degree and Honors curriculum requirements.

To complete Honors Fellows curriculum requirements, Honors Students must complete a capstone experience. The requirement may be met by engaging in the Undergraduate Research Scholars Program, by preparing and teaching an Honors Seminar as part of the Undergraduate Teacher Scholars Program, by undertaking a community service project as a participant in the Undergraduate Service Scholars Program, by developing an enhancement project for a student organization through the Undergraduate Leadership Scholars Program or by completing a capstone project designated by their home department. Students should consult with a University Honors Program advisor in the planning stages to seek approval for their capstone experience.

Honors Students are afforded several avenues to earn Honors credit in addition to regularly offered Honors courses. Honors Students may contract for Honors credit, engage in Honors independent study or take graduate courses that count toward undergraduate degree requirements. Honors Students should consult with University Honors Program advisors about these opportunities.

Honors Students with unique intellectual interests and specific educational goals may also “major” in Honors by pursuing the innovative University Studies – Honors (USHN) degree. Students may combine a range of related academic areas into a coherent degree plan by designating an “area of concentration” in combination with two established minor fields of study. The formulation of the degree plan requires students to conceptually link their course selection to a specific “problem” that will be addressed in a capstone thesis.

Maintaining Honors Status

To remain in the Honors Fellows curriculum, Honors Students must:

1. Maintain a 3.5 cumulative GPR,
2. Maintain a 3.25 GPR in honors coursework,
3. Maintain full time enrollment status,
4. Make progress toward curriculum requirements by taking at least 6 Honors credits per year,
5. Fulfill annual co-curricular participation requirements,
   a. Freshmen: Live in Honors Freshman Housing (or obtain a waiver) and participate in the Learning Community Course, and
   b. Continuing Students: Participate in at least one Honors Student Council event each semester.
   c. All: Prepare or update an ePortfolio on an annual basis.

Honors Students who fail to meet any of these requirements will be given a semester of probation to correct any deficiencies. Honors Students who fail to meet requirements after a semester of probation will be dismissed from the program.

University Scholars

The University Scholars program identifies students who embody academic leadership and enhances the personal, professional and intellectual development of these students.

University Scholars receive a scholarship stipend and participate in a number of development activities, including University Scholar Exploration Series, which are intimate discussion-based seminars offered on a wide variety of topics. Additionally, University Scholars serve as ambassadors for Honors and Undergraduate Research at Texas A&M University, representing the office at outreach events and in our publicity materials.

Each spring semester, eligible students are invited to apply for the University Scholar program. The application process involves an extensive written application and, for the approximately 40 students selected as semi-finalists, an in-depth interview. In the end, approximately 12 students are invited to join the University Scholar program.

Freshmen who meet the eligibility criteria for the program will be contacted via their official Texas A&M University email accounts at the start of the
Spring semester. Students with questions about eligibility should contact Honors and Undergraduate Research.

**Honors Student Services**

Honors Students have access to numerous special services and programs. Throughout the academic year, Honors and Undergraduate Research coordinates several recreational and community-building events, lectures and workshops. Honors Students are invited to engage in leadership opportunities and contribute to the development of university-level Honors programming through the Honors Student Council and as Honors Housing Community leaders or University Scholars.

Honors Students also receive additional academic advising to help them complete the Honors curriculum; furthermore, specialized advising is available to help students prepare for major national fellowship competitions such as the Rhodes, Truman or Goldwater Scholarships, as well as the Fulbright Program for U.S. Students and the National Science Foundation Graduate Research Fellowship Program, among others. Information about services and opportunities for Honors Students is distributed regularly via weekly email bulletin.

**Services for All Students**

Honors and Undergraduate Research challenges all motivated and high-achieving Texas A&M students to explore their world, expand their horizons and excel academically. While some services of the office are exclusive to Honors Students, advisors are available to talk with any student who is interested in sampling the academic challenge of an Honors course, committing to an undergraduate research project, applying to the University Honors Program or engaging the process of self-discovery entailed in preparation for national fellowships.

Continuing students with a minimum 3.5 cumulative GPR who have not applied or not been accepted to the Honors Fellows program may enroll in honors coursework during their assigned registration time. Students who would like to meet with a University Honors Program advisor may sign up for an appointment through Sundial. All students interested in the services offered by Honors and Undergraduate Research are encouraged to sign up for the email bulletin.

**Graduation with Honors**

All Honors courses and participation in the Undergraduate Research Scholars program are designated on a student’s transcript, demonstrating to future employers or admissions committees that the student has engaged with an enriched, challenging curriculum. Honors Students who complete the Honors Fellows curriculum are further designated as Honors Fellows.

Undergraduates in some academic colleges and departments may pursue additional graduation distinctions. These graduation distinction requirements work in concert with the Honors Fellows plan, and many students graduate with multiple distinctions. In general, all Honors graduation distinctions require that the student complete a substantial body of Honors coursework, hold a minimum cumulative Texas A&M GPR of 3.5, and a cumulative Honors course GPR of 3.25 with no grade lower than a C in an Honors course.

These Honors graduation distinctions are separate from “Latin Honors” such as *cum laude*, *summa cum laude* or *magna cum laude*, which are conferred by the Office of the Registrar and are based upon cumulative GPR and residency requirements.
Transition Academic Programs

Transition Academic Programs provides academic advising services for students transitioning between majors and programming for students transitioning from high school to college. Campus-wide programs coordinated by Transition Academic Programs include Aggie Gateways to Success, the FOCUS Learning Communities, and the Texas A&M Blinn TEAM (Transfer Enrollment to A&M) Program.

Academic Advising for Students in Transition

Transition Academic Programs helps students changing majors develop a realistic academic plan, transition into a new degree-granting major, and progress toward timely graduation. Currently enrolled Texas A&M students who move into Transition Academic Programs are only guaranteed one semester to complete necessary requirements to move into a degree-granting major.

Aggie Gateways to Success

Students are selected during the admissions process to participate in Gateway during the summer prior to their first fall semester at Texas A&M University. Participating students are assigned courses for the second summer session (July-August). Students who pass all summer courses with at least a 2.0 grade point average can declare a major and enroll for the fall semester. Financial aid is available for students enrolled in Gateway. Participants must reside on campus during the summer.

The Texas A&M Blinn TEAM Program

The Texas A&M-Blinn TEAM Program ("TEAM") is a collaborative, co-enrollment partnership between Texas A&M University and Blinn College. To be considered for participation in the TEAM program, a prospective student must apply for regular freshman admission and meet all admission criteria. TEAM students must enroll in a minimum of 12 total credit hours per semester, three-to-five at Texas A&M and the remainder at Blinn College. At the conclusion of the sophomore year, students who have completed 45 Blinn and 15 Texas A&M credit hours, with a 3.0 or higher grade point average at each school, will be fully admitted to Texas A&M University without an additional application process. TEAM students may apply for full Texas A&M admission via the transfer admission process before completion of the two-year TEAM format. TEAM students are able to access most student services and programs on both campuses, to include participation in the Corps of Cadets and Greek Life. They may apply for on-campus housing at A&M, as well as financial aid (based upon their combined credit hours from both schools).

FOCUS Learning Community

FOCUS offers first-year Regents’ Scholarship recipients a learning community experience while they are building Foundations of Continued Undergraduate Success (FOCUS). During the fall and spring semesters of the first year, FOCUS students enroll in one core curriculum course taught in a small section with 25 or fewer students. Each course is linked to a weekly non-credit mentor-led In-FOCUS session during which the cohort delves into connection, achievement, respect, and exploration as guiding principles for personal development and responsibility in university life. FOCUS students benefit from professional staff guidance, peer mentoring, and monthly co-curricular activities. FOCUS students may apply to the optional FOCUS Living-Learning Community in Keathley Hall. Regents’ Scholars may register for FOCUS on the FOCUS (http://focus.tamu.edu) website during the spring/summer prior to enrolling at Texas A&M University. Students who are not eligible for Regents’ Scholarships may request placement on the wait list.
University Studies Degrees

The University Studies Degree provides students the flexibility to combine areas of study that are of special interest. The combination of courses may not be possible through existing degree plans. This flexibility may be attractive to students who have particular career paths or post-baccalaureate degree paths in mind.

A University Studies Degree consists of a concentration of 21-24 hours and two minors of 15-18 hours each and requires 120 hours for completion. A University Studies major will be considered a student in the college that offers the concentration and will receive academic advising services from that college. The student’s diploma will list Bachelor of Arts or Bachelor of Science in University Studies.

Information on specific University Studies degree programs is listed with individual colleges.

- University Studies - BA, Race, Gender, Ethnicity Concentration (p. 501)
- University Studies - BS, Environmental Business Concentration (p. 167)
- University Studies - BS, Leadership Studies Concentration (p. 122)
- University Studies - BS, Global Arts Planning, Design, and Construction Concentration (p. 204)
- University Studies - BS, Business Concentration (p. 240)
- University Studies - BS, Child Professional Services (non-certification program) Concentration (p. 256)
- University Studies - BS, Dance Concentration (p. 276)
- University Studies - BS, Sports Conditioning Concentration (p. 277)
- University Studies - BS, Sports Leadership Concentration (p. 278)
- University Studies - BS, Geography Concentration (p. 390)
- University Studies - BS, Geographic Information Science and Technology Concentration (p. 390)
- University Studies - BS, Journalism Studies Concentration (p. 501)
- University Studies - BS, Race, Gender, Ethnicity Concentration (p. 504)
- University Studies - BS, Mathematics for Business Concentration (p. 568)
- University Studies - BS, Mathematics for Teaching Concentration (p. 570)
- University Studies - BS, Mathematics for Pre-Professionals Concentration (p. 569)
- University Studies - BS, Mathematics for Secondary Teaching Concentration (p. 569)
- University Studies - BS, Biomedical Sciences Concentration (p. 581)
Interdisciplinary Programs

Texas A&M University offers interdisciplinary programs between the various colleges of the university.

Majors

College of Agriculture and Life Sciences
- Bachelor of Science in Agribusiness (p. 107)
- Bachelor of Science in Environmental Studies (p. 166)

College of Geosciences
- Bachelor of Science in Environmental Studies (p. 363)

Masters
- Master of Agribusiness in Agribusiness (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/interdisciplinary/mab)
- Master of Biotechnology in Biotechnology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/interdisciplinary/mbiot)
- Master of Science in Engineering Systems Management (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/interdisciplinary/engineering-systems-management-ms)
- Master of Science in Genetics (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/interdisciplinary/genetics-ms)
- Master of Science in Marine Biology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/interdisciplinary/marine-biology-ms)
- Master of Science in Molecular and Environmental Plant Sciences (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/interdisciplinary/molecular-environmental-plant-sciences-ms)
- Master of Science in Neuroscience (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/interdisciplinary/neuroscience-ms)
- Master of Science in Toxicology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/interdisciplinary/toxicology-ms)
- Master of Science in Water Management and Hydrological Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/interdisciplinary/water-management-hydrological-science-ms)
- Master of Water Management and Hydrological Science in Water Management and Hydrological Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/interdisciplinary/mwm)

Doctoral
- Doctor of Philosophy in Agribusiness and Managerial Economics (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/interdisciplinary/agribusiness-managerial-economics-phd)
- Doctor of Philosophy in Ecology and Evolutionary Biology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/interdisciplinary/ecology-evolutionary-biology-phd)
- Doctor of Philosophy in Genetics (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/interdisciplinary/genetics-phd)
- Doctor of Philosophy in Marine Biology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/interdisciplinary/marine-biology-phd)
- Doctor of Philosophy in Molecular and Environmental Plant Sciences (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/interdisciplinary/molecular-environmental-plant-sciences-ms)

Neuroscience

Interdisciplinary Program in Neuroscience

Chair: J. Welsh

Neuroscience is a field devoted to the scientific study of the nervous system, from its molecular/cellular underpinnings to the organization of neural circuits, and the manifestation of this biological/neurochemical machinery as behavioral, physiological and psychological processes. It aims to detail both how the normal system operates and how alterations in function contribute to clinical diseases, such as mental illness, dementia, developmental disorders, neurodegenerative diseases, chronic pain, drug addiction, and the loss of function with aging or neural injury.

Minors

Neuroscience Minor (p. 97)

Certificates

Neuroscience Certificate (p. 98)

Neuroscience - Minor

A minor in Neuroscience is considered an interdisciplinary minor with course selections in the Departments of Biology, Psychology, Philosophy and Veterinary Integrative Biosciences. Please be aware that each course selection may have prerequisite requirements that must be met.

To apply for admission to the Minor in Neuroscience, students must complete the Minor Approval Form. It must be signed by the NRSC academic advisor and then submitted to your major advisor.

Program Requirements

The coursework listed represents various sub-disciplines within the field of Neuroscience and would give the student an overall knowledge base fitting a minor in Neuroscience. No grade below a C is acceptable to meet minor requirements.

Select from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>BIOL 388</td>
<td>Principles of Animal Physiology</td>
</tr>
<tr>
<td>BIOL 435</td>
<td>Laboratory for Regulatory and Behavioral Neuroscience</td>
</tr>
<tr>
<td>NRSC 277/</td>
<td>Introduction to Neuroscience</td>
</tr>
<tr>
<td>VIBS 277</td>
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<tr>
<td>NRSC 289</td>
<td>Special Topics in…</td>
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<tr>
<td>NRSC 311/</td>
<td>Comparative Psychology</td>
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<td>PSYC 311</td>
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NRSC 320/ PSYC 320  Sensation-Perception  
NRSC 331/ PSYC 331  Social Neuroscience  
NRSC 332/ PSYC 332  Neuroscience of Learning and Memory  
NRSC 333/ PSYC 333  Biology of Psychological Disorders  
NRSC 335/ PSYC 335  Physiological Psychology  
NRSC 340/ PSYC 340  Psychology of Learning  
NRSC 360/ PSYC 360  Health Psychology and Behavioral Medicine  
NRSC 407/ VIBS 407  Core Ideas in Neuroscience  
NRSC 434/ BIOL 434  Regulatory and Behavioral Neuroscience  
NRSC 450/ VIBS 450  Mammalian Functional Neuroanatomy  
NRSC 485 Directed Studies  
NRSC 489 Special Topics in...  
PHIL 320  Philosophy of Mind  
VIBS 401  Developmental Neurotoxicology  

**Total Semester Credit Hours**  
15

The minor must be declared before the student has completed 95 credit hours.

Student must make a grade of C or better.

For Psychology students, no more than 6 credit hours can be counted toward both the Neuroscience Minor and the Psychology Major.

A total of 6 hours of directed research (485/491) may be counted toward the minor. Directed studies may be conducted with any member of the faculty of Neuroscience. Research experiences must be approved by the NRSC faculty mentor.

## Neuroscience - Certificate

The Neuroscience Certificate, offered by the Texas A&M Institute for Neuroscience (TAMIN), provides students with the opportunity to acquire enhanced training in research in various aspects of the nervous system of humans and other animals. Students in this Certificate Program will gain a broader understanding of how the nervous system functions during health and disease through enriched experiences in areas of molecular, structural, physiological, cognitive, behavioral, computational, or bioengineering neuroscience. The Neuroscience Certificate requires completion of 16 hours of course work in designated courses. Students must complete, prior to graduation, a combination of coursework and inquiry-based research (or an internship), which will be completed under the supervision of a TMIN faculty member.

**Steps:**

 Normally, students should apply to the Neuroscience Certificate program approximately two years before they plan to graduate. For the first two years of the program (Fall 2014-Spring 2016), students who are further along in the program may apply (and are expected to complete all requirements). To apply, students must:

1. Identify a faculty advisor who is willing to supervise Directed Studies in Research (NRSC 485/491). Working with the faculty advisor, the student must develop a brief (one paragraph) description of the proposed line of research.
2. Complete the Neuroscience Certificate Program form (http://tamin.tamu.edu/files/tamin/undergraduate/certificate/NeurosciCertificateApplication.docx) and have the faculty advisor sign it.
3. Submit the form to the TAMIN Coordinator in the Interdisciplinary Life Sciences Building, Room 3148.

Students must maintain the required GPA for their major.

Students must present their research at one TAMU Student Research Week and a poster at the Annual TAMIN Neuroscience Symposium held in the spring semester.

Students are expected to file a degree plan for their major within the administering department at the start of their junior year.

Students wishing to obtain an Honors Neuroscience Certificate must maintain a GPA of 3.5. Please visit the Honors Office in Henderson Hall to request honors credit and to complete any paperwork required by that office.

## Program Requirements

### Required Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<tbody>
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<td>NRSC 485</td>
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<td>Research</td>
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<td>NRSC 277</td>
<td>Introduction to Neuroscience</td>
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<td>VIBS 277</td>
<td></td>
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<tr>
<td>NRSC 340</td>
<td>Psychology of Learning</td>
</tr>
<tr>
<td>PSYC 340</td>
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<tr>
<td>NRSC 434</td>
<td>Regulatory and Behavioral Neuroscience</td>
</tr>
<tr>
<td>BIOL 434</td>
<td></td>
</tr>
<tr>
<td>NRSC 681</td>
<td>Seminar</td>
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</table>

### Prescribed electives

<table>
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<tr>
<th>Code</th>
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<tbody>
<tr>
<td>BIOL 434</td>
<td>Regulatory and Behavioral Neuroscience</td>
</tr>
<tr>
<td>NRSC 434</td>
<td></td>
</tr>
<tr>
<td>NRSC 277</td>
<td>Introduction to Neuroscience</td>
</tr>
<tr>
<td>VIBS 277</td>
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<tr>
<td>NRSC 311</td>
<td>Comparative Psychology</td>
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<tr>
<td>PSYC 311</td>
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</tr>
<tr>
<td>NRSC 320</td>
<td>Sensation-Perception</td>
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<tr>
<td>PSYC 320</td>
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<tr>
<td>NRSC 331</td>
<td>Social Neuroscience</td>
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<tr>
<td>PSYC 331</td>
<td></td>
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<tr>
<td>NRSC 332</td>
<td>Neuroscience of Learning and Memory</td>
</tr>
<tr>
<td>PSYC 332</td>
<td></td>
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<tr>
<td>NRSC 333</td>
<td>Biology of Psychological Disorders</td>
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<tr>
<td>PSYC 333</td>
<td></td>
</tr>
<tr>
<td>NRSC 335</td>
<td>Physiological Psychology</td>
</tr>
<tr>
<td>PSYC 335</td>
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</tr>
</tbody>
</table>

The minor must be declared before the student has completed 95 credit hours.

Student must make a grade of C or better.

For Psychology students, no more than 6 credit hours can be counted toward both the Neuroscience Minor and the Psychology Major.

A total of 6 hours of directed research (485/491) may be counted toward the minor. Directed studies may be conducted with any member of the faculty of Neuroscience. Research experiences must be approved by the NRSC faculty mentor.

**Steps:**

Normally, students should apply to the Neuroscience Certificate program approximately two years before they plan to graduate. For the first two years of the program (Fall 2014-Spring 2016), students who are further along in the program may apply (and are expected to complete all requirements). To apply, students must:

1. Identify a faculty advisor who is willing to supervise Directed Studies in Research (NRSC 485/491). Working with the faculty advisor, the student must develop a brief (one paragraph) description of the proposed line of research.
2. Complete the Neuroscience Certificate Program form (http://tamin.tamu.edu/files/tamin/undergraduate/certificate/NeurosciCertificateApplication.docx) and have the faculty advisor sign it.
3. Submit the form to the TAMIN Coordinator in the Interdisciplinary Life Sciences Building, Room 3148.

Students must maintain the required GPA for their major.

Students must present their research at one TAMU Student Research Week and a poster at the Annual TAMIN Neuroscience Symposium held in the spring semester.

Students are expected to file a degree plan for their major within the administering department at the start of their junior year.

Students wishing to obtain an Honors Neuroscience Certificate must maintain a GPA of 3.5. Please visit the Honors Office in Henderson Hall to request honors credit and to complete any paperwork required by that office.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>NRSC 340/</td>
<td>Psychology of Learning</td>
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<td>PSYC 340</td>
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<td>NRSC 360/</td>
<td>Health Psychology and Behavioral Medicine</td>
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<td>PSYC 360</td>
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<tr>
<td>NRSC 434/</td>
<td>Regulatory and Behavioral Neuroscience</td>
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<tr>
<td>BIOL 434</td>
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<tr>
<td>NRSC 450/</td>
<td>Mammalian Functional Neuroanatomy</td>
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<td>VIBS 450</td>
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<td>Other electives</td>
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<tr>
<td>BICH 410</td>
<td>Comprehensive Biochemistry I</td>
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<tr>
<td>BICH 411</td>
<td>Comprehensive Biochemistry II</td>
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<tr>
<td>BICH 431/</td>
<td>Molecular Genetics</td>
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<tr>
<td>BIOL 319</td>
<td>Integrated Human Anatomy and Physiology I</td>
</tr>
<tr>
<td>BIOL 320</td>
<td>Integrated Human Anatomy and Physiology II</td>
</tr>
<tr>
<td>BIOL 388</td>
<td>Principles of Animal Physiology</td>
</tr>
<tr>
<td>BIOL 413</td>
<td>Cell Biology</td>
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<td>BIOL 423</td>
<td>Cell Biology Laboratory</td>
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<tr>
<td>GENE 302</td>
<td>Principles of Genetics</td>
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<tr>
<td>GENE 405/</td>
<td>Mammalian Genetics</td>
</tr>
<tr>
<td>BIMS 405</td>
<td></td>
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<tr>
<td>GENE 431/</td>
<td>Molecular Genetics</td>
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<tr>
<td>BICH 431</td>
<td></td>
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<tr>
<td>NUTR 469/</td>
<td>Experimental Nutrition and Food Science</td>
</tr>
<tr>
<td>FSTC 369</td>
<td>Laboratory</td>
</tr>
<tr>
<td>PHIL 320</td>
<td>Philosophy of Mind</td>
</tr>
<tr>
<td>VIBS 401</td>
<td>Developmental Neurotoxicology</td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours** 16

1. No more than six credits can be used towards the Neuroscience Certificate. This limit does not preclude students from taking additional hours. Those hours will not, however, count towards the 16 credit hours needed to complete the Neuroscience Certificate.

2. If a student takes more than one course, it can count towards their electives.
College of Agriculture and Life Sciences

Administrative Officers
Vice Chancellor and Dean - Mark Hussey, Ph.D.
Executive Associate Dean - Alan Sams, Ph.D.
Associate Dean for Academic Operations - Kim E. Dooley, Ph.D.
Associate Dean for Graduate Programs and Faculty Development - David W. Reed, Ph.D.
Associate Dean for Student Development - Chris L. Skaggs, Ph.D.
Assistant Dean for Student Success - Danielle A. Harris, Ph.D.

General Statement
Ensuring an adequate and safe food supply for a rapidly expanding world population, succeeding in a global economy, and maintaining our planet’s natural resources and biodiversity are some of the challenges that are being met by graduates from the College of Agriculture and Life Sciences. Our students apply knowledge to solve problems as scientists, business leaders, engineers, educators, physicians, and other professionals. Enthusiastic and competitive students, a distinguished faculty, innovative teaching methods, outstanding advisors, and abundant experiential learning opportunities, including undergraduate research, result in the College of Agriculture and Life Sciences being considered one of the top colleges of agriculture in the country.

Our 32 majors and 21 minors provide students technical expertise and a broad education so that they can meet the challenges of feeding the world, improving health, protecting the environment, and enriching youth. Abilities of thinking creatively and critically, solving problems, making decisions and communicating effectively are developed, along with learning how to work with people of varied backgrounds. Relating well with others, leadership and fellowship are vital to success in the “real world.” Faculty members who teach undergraduate classes include many who are recognized nationally and internationally for research and other accomplishments in their disciplines. Interested undergraduates also have a chance to be a part of research projects themselves.

There are many opportunities for high impact courses and programs, such as undergraduate research, international experiences, internships and field study. The college has study abroad programs in the Americas, Asia, Europe, Oceania, Africa, and the Caribbean. All students are encouraged to participate in at least one of these high impact activities before graduation. Honors programs or stand-alone honors programs are available in many of the college’s academic departments. There are numerous student organizations that are sponsored by departments or the college such as the Freshman Leadership Program and the Agricultural and Life Sciences Student Council. These organizations promote interaction among students who share interests, and foster leadership skills.

The College of Agriculture and Life Sciences and its departments offer a variety of scholarships to students on a competitive basis. Many are reserved for incoming freshmen or transfer students. Additional information and application forms for college-level scholarships for current students can be obtained from the Scholarships and Financial Aid Office. Information about departmental scholarships can be obtained from the departments directly.

College of Agriculture and Life Sciences Baccalaureate Degree Programs
Each major can be planned to prepare students for graduate study or admission to professional schools in medicine, dentistry, veterinary medicine, other health professions and law. Students in programs, such as biochemistry, genetics and nutritional sciences, are highly recruited for medicine, nursing, and other health professions. Animal science and wildlife and fisheries sciences are among several excellent choices for students interested in veterinary medicine. Students with a background in natural resources, the agricultural industry, forensics, or life sciences can use that knowledge well if they choose to enter law school. An environmental lawyer with a degree in a natural resource area is better equipped to incorporate the science with the law.

Advising is provided for each student in the college through offices in the individual academic departments. Departmental faculty and professional advisors provide assistance on course selection and other academic issues and serve as mentors for career planning and admission to graduate or professional school. Advisors serve as professional consultants for students in the College with the objective of avoiding problems if possible and solving problems if needed.

Requirements for Graduation
Requirements for graduation are listed in the Texas A&M University Student Rules and this catalog. With the exception of general elective requirements, courses taken to satisfy degree requirements must be taken for letter grades.

International and Cultural Diversity Requirement
Texas A&M University requires its students to meet an International and Cultural Diversity requirement as part of the Graduation requirements. Meeting this requirement will require the careful selection of courses. The student is directed to the Requirements for a Baccalaureate Degree (p. 24) section of this catalog for detailed information regarding this requirement and also is encouraged to seek the advice of the student’s academic advisor.

Internships and Cooperative Education
Internships provide real-world experience in industries related to a student’s education and professional career preparation. Students return to campus with a broader perspective and more intense interest in their education. The experiences are so valuable that many students complete more than one internship. Most departments in the College offer academic credit for the satisfactory completion of an internship. In fact, an internship is required for graduation in some degree programs.

The Agricultural and Natural Resources Policy (ANRP) Internship Program places students from the College of Agriculture and Life Sciences in policy-based internships in Austin, TX, Washington, D.C. and Rome, Italy for a semester or summer. Selection for the program is based upon factors such as academic performance, leadership, and a student’s general interest in learning the policy process.

Cooperative education is a program of work and study that allows students to gain practical experience in their chosen field while pursuing a degree.
Students interested in information should consult with their academic advisor.

**Graduate Study**

All departments in the College of Agriculture and Life Sciences offer graduate degrees at the master’s and doctoral levels. Every department offers courses and programs online.

Students are encouraged to contact the department in which they wish to major to obtain information about graduate study. Information on admission, programs available, etc., can be found in the *Texas A&M University Graduate and Professional Catalog*.

**Teacher Certification**

Texas teacher certification in agricultural science is available through the Department of Agricultural Leadership, Education, and Communications. Certification is granted through the State Board of Educator Certification (SBEC) upon a student’s completion of the course of study administered by the department. The undergraduate major in agricultural science includes all coursework required for our recommending a student to SBEC for teacher certification. The requirements can be completed with any major in the College of Agriculture and Life Sciences. See an advisor in Agricultural Science, Department of Agricultural Leadership, Education, and Communications, for more information.

**Majors**

**College of Agriculture and Life Sciences**

- Bachelor of Science in Renewable Natural Resources (p. 142)

**Department of Agricultural Economics**

- Bachelor of Science in Agribusiness (p. 107)
- Bachelor of Science in Agricultural Economics, Finance and Real Estate Option (p. 109)
- Bachelor of Science in Agricultural Economics, Food Marketing Systems Option (p. 110)
- Bachelor of Science in Agricultural Economics, Policy and Economic Analysis Option (p. 112)
- Bachelor of Science in Agricultural Economics, Rural Entrepreneurship Option (p. 113)
- Bachelor of Science in Agricultural Economics and Master of Public Service and Administration, 5-Year Degree Program (p. 115)

**Department of Agricultural Leadership, Education, and Communications**

- Bachelor of Science in Agricultural Communications and Journalism (p. 119)
- Bachelor of Science in Agricultural Leadership and Development (p. 120)
- Bachelor of Science in Agricultural Science (p. 121)
- Bachelor of Science in University Studies, Leadership Studies Concentration (p. 122)

**Department of Animal Science**

- Bachelor of Science in Animal Science, Production/Industry Option (p. 125)
- Bachelor of Science in Animal Science, Science Option (p. 127)

**Department of Biochemistry and Biophysics**

- Bachelor of Science in Biochemistry (p. 130)
- Bachelor of Science in Genetics (p. 131)

**Department of Biological and Agricultural Engineering**

- Bachelor of Science in Agricultural Systems Management (p. 134)
- Bachelor of Science in Biological and Agricultural Engineering (p. 135)—offered in conjunction with the Dwight Look College of Engineering

**Department of Ecosystem Science and Management**

- Bachelor of Science in Ecological Restoration (p. 138)
- Bachelor of Science in Forestry (p. 139)
- Bachelor of Science in Rangeland Ecology and Management, Ranch Management Option (p. 140)
- Bachelor of Science in Rangeland Ecology and Management, Rangeland Resources Option (p. 141)
- Bachelor of Science in Renewable Natural Resources (p. 142)
- Bachelor of Science in Spatial Sciences (p. 144)

**Department of Entomology**

- Bachelor of Science in Entomology (p. 146)
- Bachelor of Science in Forensic and Investigative Sciences, Pre-Law Emphasis (p. 149)
- Bachelor of Science in Forensic and Investigative Sciences, Science Emphasis (p. 150)

**Department of Horticultural Sciences**

- Bachelor of Arts in Horticulture (p. 153)
- Bachelor of Science in Horticulture (p. 154)

**Department of Nutrition and Food Science**

- Bachelor of Science in Food Science and Technology, Food Science Option (p. 158)
- Bachelor of Science in Food Science and Technology, Industry Option (p. 156)
- Bachelor of Science in Nutrition, Didactic Program in Dietetics Track (p. 160)
- Bachelor of Science in Nutrition, General Nutrition Track (p. 161)
- Bachelor of Science in Nutrition, Molecular and Experimental Track (p. 163)

**Department of Plant Pathology and Microbiology**

- Bachelor of Science in Bioenvironmental Sciences (p. 165)
- Bachelor of Science in Environmental Studies (p. 166)
- Bachelor of Science in University Studies, Environmental Business Concentration (p. 167)
Department of Poultry Science
- Bachelor of Science in Poultry Science, Industry Emphasis (p. 169)
- Bachelor of Science in Poultry Science, Technical Emphasis (p. 170)

Department of Recreation, Park and Tourism Sciences
- Bachelor of Science in Community Development (p. 173)
- Bachelor of Science in Recreation, Park and Tourism Sciences, Community Recreation and Park Administration Certificate (p. 174)
- Bachelor of Science in Recreation, Park and Tourism Sciences, Parks and Conservation Certificate (p. 175)
- Bachelor of Science in Recreation, Park and Tourism Sciences, Tourism Management Certificate (p. 176)
- Bachelor of Science in Recreation, Park and Tourism Sciences, Youth Development Certificate (p. 177)
- Bachelor of Science in Renewable Natural Resources (p. 142)

Department of Soil and Crop Sciences
- Bachelor of Science in Plant and Environmental Soil Science, Crops Emphasis (p. 181)
- Bachelor of Science in Plant and Environmental Soil Science, Soil and Water Emphasis (p. 182)
- Bachelor of Science in Turfgrass Science (p. 183)

Department of Wildlife and Fisheries Sciences
- Bachelor of Science in Renewable Natural Resources (p. 142)
- Bachelor of Science in Wildlife and Fisheries Sciences, Aquatic Ecology and Conservation Option (p. 185)
- Bachelor of Science in Wildlife and Fisheries Sciences, Vertebrate Zoology Option (p. 186)
- Bachelor of Science in Wildlife and Fisheries Sciences, Wildlife Ecology and Conservation Option (p. 187)

Minors
Minors consist of a group of specified courses totaling between 15 and 18 credit hours. Students who are eligible to enroll in a minor should contact an advisor in the department offering the minor. Minors available in the college are listed.

Department of Agricultural Economics
- Agricultural Economics Minor (p. 117)
- Financial Planning Minor (p. 117)

Department of Agricultural Leadership, Education, and Communications
- Agricultural Communications and Journalism Minor (p. 122)
- International Agricultural Development Minor (p. 123)
- Leadership Minor (p. 123)

Department of Animal Science
- Animal Science Minor (p. 128)

Department of Biochemistry and Biophysics
- Biochemistry Minor (p. 132)
- Genetics Minor (p. 133)

Department of Biological and Agricultural Engineering
- Agricultural Systems Management Minor (p. 137)

Department of Ecosystem Science and Management
- Forestry Minor (p. 144)
- Rangeland Ecology and Management Minor (p. 145)
- Spatial Sciences Minor (p. 145)

Department of Entomology
- Entomology Minor (p. 151)

Department of Horticultural Sciences
- Horticulture Minor (p. 155)

Department of Plant Pathology and Microbiology
- Bioenvironmental Sciences Minor (p. 169)

Department of Poultry Science
- Poultry Science Minor (p. 171)

Department of Recreation, Park and Tourism Science
- Park and Natural Resource Management Minor (p. 178)
- Tourism Management Minor (p. 178)

Department of Soil and Crop Sciences
- Agronomy Minor (p. 184)
- Environmental Soil Science Minor (p. 184)

Department of Wildlife and Fisheries Sciences
- Wildlife and Fisheries Sciences Minor (p. 189)

Certificates
Certificate programs document expertise in an area beyond a major or minor. Information on requirements for certificate programs is available from the advisor of the department offering the certificate. Certificate programs available in the college are listed.

Department of Agricultural Economics
- International Trade and Agriculture Certificate (p. 118)

Department of Animal Science
- Equine Science Certificate (p. 128)
- Meat Science Certificate (p. 128)
Department of Ecosystem Science and Management

- Watershed Certificate (p. 145)

Department of Entomology

- Public Health Entomology Certificate (p. 152)

Department of Recreation, Park and Tourism Science

- Community Recreation and Park Administration Certificate
- Parks and Conservation Certificate
- Professional Event Manager Certificate (p. 179)
- Tourism and Hospitality Management Certificate (p. 179)
- Tourism Management Certificate
- Youth Development Certificate

Masters

College of Agriculture and Life Sciences

- Master of Natural Resources Development in Natural Resources Development (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/recreation-park-tourism-sciences/mnrd)
- Master of Science in Plant Breeding (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/horticultural-sciences/plant-breeding-ms)

Department of Agricultural Economics

- Master of Agriculture in Agricultural Economics (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/agricultural-economics/agriculture-masters)
- Master of Science in Agricultural Economics (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/entomology/entomology-magr)

Department of Agricultural Leadership, Education, and Communications

- Master of Agriculture in Agricultural Development (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/agricultural-leadership-education-communications/agricultural-development-agriculture-masters)
- Master of Education in Agricultural Leadership, Education and Communication—offered in conjunction with the College of Education and Human Development (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/agricultural-leadership-education-communications/med)
- Master of Science in Agricultural Leadership, Education and Communication—offered in conjunction with the College of Education and Human Development (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/agricultural-leadership-education-communications/ms)

Department of Animal Science

- Master of Science in Animal Breeding (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/animal-science/animal-breeding-ms)

- Master of Agriculture in Animal Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/animal-science/magr)
- Master of Science in Animal Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/animal-science/ms)
- Master of Equine Industry Management in Equine Industry Management (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/animal-science/equine-industry-reproduction-ms)
- Master of Science in Physiology of Reproduction (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/animal-science/physiology-reproduction-ms)

Department of Biochemistry and Biophysics

- Master of Science in Biochemistry (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/biochemistry-biophysics/biochemistry-ms)

Department of Biological and Agricultural Engineering

- Master of Agriculture in Agricultural Systems Management (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/biological-agricultural-engineering/systems-management-magr)
- Master of Science in Agricultural Systems Management (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/biological-agricultural-engineering/systems-management-ms)
- Master of Engineering in Biological and Agricultural Engineering—offered in conjunction with the Dwight Look College of Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/biological-agricultural-engineering/engineering-meng)
- Master of Science in Biological and Agricultural Engineering—offered in conjunction with the Dwight Look College of Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/biological-agricultural-engineering/biological-agriculture-engineering-ms)

Department of Ecosystem Science and Management

- Master of Agriculture in Ecosystem Science and Management (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/ecosystem-science-management/magr)
- Master of Science in Ecosystem Science and Management (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/ecosystem-science-management/ms)
- Master of Natural Resources Development in Natural Resources Development (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/entomology/entomology-ms)

Department of Entomology

- Master of Science in Entomology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/entomology/ms)
Department of Horticultural Sciences
- Master of Agriculture in Horticulture (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/horticultural-sciences/magr)
- Master of Science in Horticulture (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/horticultural-sciences/horticulture-ms)
- Master of Science in Plant Breeding (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/horticultural-sciences/plant-breeding-ms)

Department of Nutrition and Food Science
- Master of Agriculture in Food Science and Technology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/nutrition-food-science/agriculture-food-science/phd)
- Master of Science in Food Science and Technology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/nutrition-food-science/food-science-technology-ms)
- Master of Science in Nutrition (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/nutrition-food-science/nutrition-ms)

Department of Plant Pathology and Microbiology
- Master of Science in Plant Pathology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/plant-pathology-microbiology/plant-pathology-phytopathology/ms)

Department of Poultry Science
- Master of Agriculture in Poultry Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/poultry-science/phd)
- Master of Science in Poultry Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/poultry-science/ms)

Department of Recreation, Park and Tourism Sciences
- Master of Natural Resources Development in Natural Resources Development (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/recreation-park-tourism-sciences/natural-resources-development/ms)
- Master of Science in Recreation, Park and Tourism Sciences (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/recreation-park-tourism-sciences/recreation-park-tourism-science/ms)
- Master of Recreation and Resources Development in Recreation and Resources Development (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/recreation-park-tourism-sciences/recreation-park-tourism-science/ms)

Department of Soil and Crop Sciences
- Master of Science in Agronomy (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/soil-crop-sciences/agronomy-ms)
- Master of Science in Soil Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/soil-crop-sciences/soil-science-ms)
- Master of Science in Plant Breeding (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/soil-crop-sciences/plant-breeding-ms)
- Master of Science in Soil Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/soil-crop-sciences/soil-science-ms)

Department of Wildlife and Fisheries Sciences
- Master of Natural Resources Development in Natural Resources Development (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/wildlife-fisheries-sciences/mnrds)
- Master of Science in Wildlife and Fisheries Sciences (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/wildlife-fisheries-sciences/wildlife-fisheries-science/ms)

Doctoral

College of Agriculture and Life Sciences
- Doctor of Philosophy in Plant Breeding (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/horticultural-sciences/plant-breeding-phd)

Department of Agricultural Economics
- Doctor of Philosophy in Agricultural Economics (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/agriculture-economic/phd)

Department of Agricultural Leadership, Education, and Communications
- Doctor of Education in Agricultural Education—offered as a joint program with Texas Tech University when offered by Distance Education (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/agriculture-leadership-education-communications/edd)
- Doctor of Philosophy in Agricultural Leadership, Education and Communication—offered in conjunction with the College of Education and Human Development (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/agriculture-leadership-education-communications/phd)

Department of Animal Science
- Doctor of Philosophy in Animal Breeding (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/animal-science/plant-breeding-phd)
- Doctor of Philosophy in Animal Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/animal-science/phd)
- Doctor of Philosophy in Physiology of Reproduction (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/animal-science/physiology-reproduction-phd)
Department of Biochemistry and Biophysics

- Doctor of Philosophy in Biochemistry (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/biochemistry-biophysics/phd)

Department of Biological and Agricultural Engineering

- Doctor of Philosophy in Biological and Agricultural Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/biological-agricultural-engineering/phd)

Department of Ecosystem Science and Management

- Doctor of Philosophy in Ecosystem Science and Management (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/ecosystem-science-management/phd)

Department of Entomology

- Doctor of Philosophy in Entomology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/entomology/phd)

Department of Horticultural Sciences

- Doctor of Philosophy in Horticulture—also offered as cooperative program with Texas A&M University - Kingsville (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/horticultural-sciences/horticulture/phd)
- Doctor of Philosophy in Plant Breeding (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/horticultural-sciences/entomology/phd)

Department of Nutrition and Food Science

- Doctor of Philosophy in Food Science and Technology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/nutrition-food-science/food-science/technology/phd)
- Doctor of Philosophy in Nutrition (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/nutrition-food-science/nutrition-phd)

Department of Plant Pathology and Microbiology

- Doctor of Philosophy in Plant Pathology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/plant-pathology-microbiology/phd)

Department of Poultry Science

- Doctor of Philosophy in Poultry Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/poultry-science/phd)

Department of Recreation, Park and Tourism Sciences

- Doctor of Philosophy in Recreation, Park and Tourism Sciences (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/recreation-park-tourism-phd)

Department of Soil and Crop Sciences

- Doctor of Philosophy in Agronomy (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/soil-crop-sciences/agronomy/phd)
- Doctor of Philosophy in Plant Breeding (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/soil-crop-sciences/plant-breeding/phd)
- Doctor of Philosophy in Soil Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/soil-crop-sciences/soil-science/phd)

Department of Wildlife and Fisheries Sciences

- Doctor of Philosophy in Wildlife and Fisheries Sciences (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/agriculture-life-sciences/wildlife-fisheries-sciences/phd)

Interdepartmental Degree Programs

The Bachelor of Science in Renewable Natural Resources degree is an interdepartmental degree in the College of Agriculture and Life Sciences. It is offered in the Department of Ecosystem Science and Management (p. 137), the Department of Recreation, Parks and Tourism Sciences, (p. 171) and the Department of Wildlife and Fisheries Sciences (p. 184).

Majors

- Bachelor of Science in Renewable Natural Resources (p. 142)

Department of Agricultural Economics

The Department of Agricultural Economics offers a Bachelor of Science degree in Agricultural Economics. The BS degree in Agricultural Economics offers students four options: Finance and Real Estate, Food Marketing Systems, Policy and Economic Analysis, and Rural Entrepreneurship. The course requirements for the freshman and sophomore years are the same for all Agricultural Economics options. In conjunction with the Bush School of Government and Public Service, the department offers a five-year program that allows a student to receive a BS in AGEC and a Master’s of Public Service and Administration degree. In addition, in conjunction with the Mays Business School, the department also offers a BS in Agribusiness.

Department of Agricultural Economics Honors Plan

The Department of Agricultural Economics at Texas A&M University offers academically talented Agricultural Economics and Agribusiness majors an opportunity to study, experience, learn, and grow. This honors plan will enrich your college experience by offering curricular challenge and stimulating your interest in research. Through the Agricultural Economics departmental honors plan, you will have an opportunity to work closely with faculty members and have in-depth conversations about class topics as well their areas of research. You will develop the vital problem solving and critical thinking skills that are valued in today’s fast-paced business culture. Honors distinctions will demonstrate your ability to handle a challenging curriculum, which can be particularly useful if you are planning
to attend graduate school or law school. The challenging coursework and fascinating co-curricular activities offered through this program will enhance your academic success.

The Department of Agricultural Economics Honors Plan is administered through the Undergraduate Programs Office, located in Room 214 of the Agriculture and Life Sciences Building. For more information, contact the Undergraduate Programs Office, (979) 845-4911, or visit our website at http://agecon.tamu.edu/undergraduate/current-students/honors/ and select the Future or Current Students link.

Faculty

Anderson, David P, Professor & Extension Specialist
Agricultural Economics
PhD, Texas A&M University, 1994

Bessler, David A, Professor
Agricultural Economics
PhD, University of California, Davis, 1977

Boadu, Frederick O, Professor
Agricultural Economics
PhD, University of Kentucky, 1981

Bryant, Henry L, Research Associate Professor
Agricultural Economics
PhD, Texas A&M University, 2003

Capps, Oral, Executive Professor
Agricultural Economics
PhD, Virginia Tech, 1979

Conner, James R, Professor
Agricultural Economics
PhD, Texas A&M University, 1970

Dooley, Kim E, Professor
Ag Leadership, Educ & Comm
PhD, Texas A&M University, 1995

Dowell, Tiffany E, Assistant Professor & Extension Specialist
Agricultural Economics
JD, University of New Mexico, 2009

Dudensing, Rebekka M, Assistant Professor & Extension Specialist
Agricultural Economics
PhD, Clemson University, 2008

Griffin, Ronald C, Professor
Agricultural Economics
PhD, University of Wisconsin, 1980

Harness, Nathaniel J, Instructional Associate Professor
Agricultural Economics
PhD, Texas Tech University, 2007

Hood, Marilyn E, Lecturer
Agricultural Economics
MBA, Texas A&M University, 1992

Ishdorj, Ariun, Assistant Professor
Agricultural Economics
PhD, Iowa State University, 2008

Klinefelter, Danny A, Professor & Extension Specialist
Agricultural Economics
PhD, University of Illinois at Urbana-Champaign, 1979

Leatham, David J, Professor
Agricultural Economics
PhD, Purdue University, 1983

Litzenberg, Kerry K, Professor
Agricultural Economics
PhD, Purdue University, 1979

McCarl, Bruce A, Distinguished Professor
Agricultural Economics
PhD, Pennsylvania State University, 1973

Menzies, Max D, Assistant Lecturer
Agricultural Economics
MS, Texas A&M University, 2004

Mjelde, James W, Professor
Agricultural Economics
PhD, University of Illinois at Urbana-Champaign, 1985

Ng, Desmond W, Associate Professor
Agricultural Economics
PhD, University of Illinois at Urbana-Champaign, 2001

Outlaw, Joe L, Professor & Extension Specialist
Agricultural Economics
PhD, Texas A&M University, 1992

Palma, Marco A, Associate Professor & Extension Specialist
Agricultural Economics
PhD, University of Florida, 2005

Park, John L, Professor & Extension Specialist
Agricultural Economics
PhD, Texas A&M University, 1996

Penson, John B, Professor
Agricultural Economics
PhD, University of Illinois at Urbana-Champaign, 1973

Price, Edwin C, Professor
Agricultural Economics
PhD, University of Kentucky, 1973

Ribera, L A, Associate Professor & Extension Specialist
Agricultural Economics
PhD, Texas A&M University, 2005

Richardson, James W, Professor
Agricultural Economics
PhD, Oklahoma State University, 1978

Rister, M E, Professor
Agricultural Economics
PhD, Michigan State University, 1981

Robinson, John R, Professor & Extension Specialist
Agricultural Economics
PhD, Texas A&M University, 1993
Rosson, Claude P, Professor
Agricultural Economics
PhD, Texas A&M University, 1982

Salin, Victoria S, Professor
Agricultural Economics
PhD, Purdue University, 1996

Senarath Dharmasena, Kalu A, Visiting Assistant Professor
Agricultural Economics
PhD, Texas A&M University, 2010

Shaw, William D, Professor
Agricultural Economics
PhD, University of Colorado, 1985

Siebert, John W, Professor
Agricultural Economics
PhD, University of California, Berkeley, 1978

Vedenov, Dmitry, Associate Professor
Agricultural Economics
PhD, Ohio State University, 2001

Williams, Gary W, Professor
Agricultural Economics
PhD, Purdue University, 1981

Woodward, Richard T, Professor
Agricultural Economics
PhD, University of Wisconsin, 1997

Wu, Ximing, Professor
Agricultural Economics
PhD, University of California, Berkeley, 2003

Zhang, Yu, Assistant Professor
Agricultural Economics
PhD, Texas A&M University, 2010

Majors

Agribusiness
• Bachelor of Science in Agribusiness (p. 107)

Agricultural Economics
• Bachelor of Science in Agricultural Economics, Finance and Real Estate Option (p. 109)
• Bachelor of Science in Agricultural Economics, Food Marketing Systems Option (p. 110)
• Bachelor of Science in Agricultural Economics, Policy and Economic Analysis Option (p. 112)
• Bachelor of Science in Agricultural Economics, Rural Entrepreneurship Option (p. 113)

5-Year Degree Program
• Bachelor of Science in Agricultural Economics and Master of Public Service and Administration (p. 115)

Minors
• Agricultural Economics Minor (p. 117)
• Financial Planning Minor (p. 117)

Certificates
• International Trade and Agriculture Certificate (p. 118)

Graduate
• Master of Agriculture in Agricultural Economics
• Master of Science in Agricultural Economics
• Doctor of Philosophy in Agricultural Economics—offered as a joint program with Texas Tech University when offered by Distance Education

Agribusiness - BS

In conjunction with Mays Business School, the College of Agriculture and Life Sciences and the Department of Agricultural Economics offer a Bachelor of Science in Agribusiness.

Students pursuing the agribusiness degree must have a GPR of 2.0 in the courses included in the Common Body of Knowledge.

Curriculum in Agribusiness (BS)
The Bachelor of Science is offered in Agribusiness. The BS Agribusiness degree prepares students for careers in the nation’s growing agribusiness sector which provides the products and services for the production, processing and distribution of food and fiber. With the potential for expanded export opportunities, the need for graduates for agribusiness positions is increasing. The agribusiness program combines the common body of knowledge requirements of a degree in business with coursework emphasizing the understanding of the unique institutional and managerial challenges facing agribusiness firms. Students integrate business management principles with technical knowledge to develop practical decision-making skills.

Upper-Level Entry into Agribusiness
The requirements and procedures for consideration for upper level are as follows:

1. In order to be considered for upper-level and possible admission into the program of study in agribusiness, a student must have:
   a. Satisfactorily completed at least 60 semester credit hours.
   b. Satisfactorily completed all of the following eight courses:

   - ACCT 229 Introductory Accounting 3
   - ACCT 230 Introductory Accounting 3
   - AGEC 217 Fundamentals of Agricultural Economics Analysis 3
   - ECON 202 Principles of Economics 3
   - ECON 203 Principles of Economics 3
   - MGMT 211 Legal and Social Environment of Business 3
   - MATH 141 Business Mathematics I 3
   - MATH 142 Business Mathematics II 3
   c. Students should complete the freshman and sophomore sequence of courses as listed under Curriculum in Agribusiness. Following this sequence will allow the timely application for consideration for upper-level.
   d. Admission, if granted, will be effective upon successful completion of the in-process courses; however, if all requirements are not met prior to the start of the next semester, admission will be revoked.
2. Transfer students: Transfer students admitted to the Agribusiness degree will be classified as AGBL (lower-level Agribusiness) students until they complete all requirements listed previously in item 1.

3. Change of curriculum students: Texas A&M students who change curriculum into the Agribusiness degree from another college or department at the University will be classified as AGBL (lower-level Agribusiness) students until they complete all requirements listed in item 1.

Program Requirements

First Year

<table>
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<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tr>
<td>Fall</td>
<td>AGEC 105</td>
<td>Introduction to Agricultural Economics</td>
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<tr>
<td></td>
<td>MATH 141</td>
<td>Business Mathematics I</td>
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<tr>
<td></td>
<td>American History (p. 23)</td>
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<tr>
<td></td>
<td>Communication elective (p. 20)</td>
<td>3</td>
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<td>Life and physical sciences elective (p. 20)</td>
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<tr>
<td>Spring</td>
<td>MATH 142</td>
<td>Business Mathematics II</td>
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<td>American History (p. 23)</td>
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<td>Creative arts elective (p. 22)</td>
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<td>Language, philosophy and culture elective (p. 21)</td>
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<td>Life and physical sciences elective (p. 20)</td>
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Second Year

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<tr>
<td>Fall</td>
<td>ACCT 229</td>
<td>Introductory Accounting</td>
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<td></td>
<td>ECON 202</td>
<td>Principles of Economics</td>
<td>3</td>
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<td></td>
<td>MGMT 211</td>
<td>Legal and Social Environment of Business</td>
<td>3</td>
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<td></td>
<td>Government/Political science elective (p. 23)</td>
<td>3</td>
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<td>Life and physical sciences elective (p. 20)</td>
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<tr>
<td>Spring</td>
<td>ACCT 230</td>
<td>Introductory Accounting</td>
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<td></td>
<td>AGEC 217</td>
<td>Fundamentals of Agricultural Economics Analysis</td>
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<td>ECON 203</td>
<td>Principles of Economics</td>
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<td>Government/Political science elective (p. 23)</td>
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Third Year

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<tr>
<th>Semester</th>
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<tbody>
<tr>
<td>Fall</td>
<td>AGEC 340</td>
<td>Agribusiness Management</td>
<td>3</td>
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<tr>
<td></td>
<td>ECON 322 or ECON 323</td>
<td>Applied Microeconomic Theory or Microeconomic Theory</td>
<td>3</td>
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<tr>
<td></td>
<td>FINC 341</td>
<td>Business Finance</td>
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<td>MKTG 321</td>
<td>Marketing</td>
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<td></td>
<td>SCMT 303</td>
<td>Statistical Methods</td>
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Spring

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<tbody>
<tr>
<td>AGEC 317</td>
<td>Economic Analysis for Agribusiness Management</td>
<td>3</td>
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<tr>
<td>AGEC 429</td>
<td>Agricultural Policy</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 363</td>
<td>Managing People in Organizations</td>
<td>3</td>
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<tr>
<td>SCMT 364</td>
<td>Operations Management</td>
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<td>Directed elective-international</td>
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<td>Term Semester Credit Hours</td>
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Fourth Year

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<tr>
<td>Fall</td>
<td>AGEC 431</td>
<td>Cases in Agribusiness Finance</td>
<td>3</td>
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<td></td>
<td>AGEC 481</td>
<td>Ethics in Agribusiness and Agricultural Economics</td>
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<td></td>
<td>Directed elective-international</td>
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<th>Semester</th>
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<th>Course Title</th>
<th>Credit Hours</th>
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<tr>
<td>Spring</td>
<td>AGEC 414</td>
<td>Agribusiness and Food Market Analysis</td>
<td>3</td>
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<tr>
<td></td>
<td>AGEC 430 or ECON 311</td>
<td>Macroeconomics of Agriculture or Money and Banking</td>
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<td></td>
<td>AGEC 440</td>
<td>Agribusiness Strategic Analysis</td>
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<td>General electives</td>
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</table>

Total Semester Credit Hours: 120

1 Satisfies the University Core Curriculum Social and Behavioral Sciences requirement.

2 For those students under ROTC contract, see Requirement 7 of the Requirements for a Baccalaureate Degree (p. 25).

3 Three hours must be selected from ENGL 103 or ENGL 104.

4 All undergraduate students must take at least two (2) specific courses in their major designated as writing intensive (W). This course is an approved W course.

5 Six hours required. Three hours of international coursework may be taken outside of the Mays Business School. A complete list of approved international electives is available in the college Undergraduate Program Office, Room 214 of the Agriculture and Life Sciences Building, or can be found on our website.

6 Three hours of technical agriculture electives to be selected from any course offered by the College of Agriculture and Life Sciences except 285s, 484s, 485s and agricultural economics courses. To be selected in consultation with an advisor.

7 Any Texas A&M or transfer course (except KINE 198 and KINE 199; STLC 001-STLC 003) not used to meet other requirements.

Agribusiness Common Body of Knowledge

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ACCT 229</td>
<td>Introductory Accounting</td>
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<td>ACCT 230</td>
<td>Introductory Accounting</td>
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<td>AGEC 217</td>
<td>Fundamentals of Agricultural Economics Analysis</td>
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<tr>
<td>AGEC 440</td>
<td>Agribusiness Strategic Analysis</td>
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<tr>
<td>AGEC 481</td>
<td>Ethics in Agribusiness and Agricultural Economics</td>
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</tbody>
</table>
BS in Agribusiness Major Field

AGEC 105 Introduction to Agricultural Economics 3
AGEC 317 Economic Analysis for Agribusiness Management 3
AGEC 340 Agribusiness Management 3
AGEC 414 Agribusiness and Food Market Analysis 3
AGEC 429 Agricultural Policy 3
AGEC 430 Macroeconomics of Agriculture 3
or ECON 311 or Money and Banking 3
AGEC 431 Cases in Agribusiness Finance 3
ECON 322 Applied Microeconomic Theory 3
or ECON 323 or Microeconomic Theory 3

Total Semester Credit Hours 24

Agricultural Economics - BS, Finance and Real Estate Option

The Bachelor of Science degree in Agricultural Economics offers students four options: Finance and Real Estate, Food Marketing Systems, Policy and Economic Analysis, and Rural Entrepreneurship. The course requirements for the freshman and sophomore years are the same for all Agricultural Economics options.

Requirements for graduation are listed in the Texas A&M University Student Rules and this catalog. With the exception of physical activity and general elective requirements, courses taken to satisfy degree requirements must be taken for letter grades.

The curriculum in Agricultural Economics is designed to train graduates for a wide variety of jobs in agriculturally-oriented business firms and agencies. Flexibility is included in the curriculum so that a student, in consultation with an academic advisor, can develop a degree program which best fits personal career objectives.

While not required on the degree plan, students are strongly encouraged to participate in internships (AGEC 484) to broaden their knowledge base and gain real-world experience to greater enhance employability after graduation. Students also have an opportunity to work one-on-one with a faculty member in a directed studies project. Directed studies projects (AGEC 485) enable students to receive additional instruction in areas of their career choice. To receive credit for AGEC 484 and/or AGEC 485 coursework, the student must meet the following requirements:

1. For Students who have completed between 30 and 59 hours total:
   a. have completed a minimum of 12 of those hours at Texas A&M
   b. have completed AGEC 105, either ECON 202 or ECON 203, MATH 141, MATH 142, AGEC 217 and ACCT 209 or ACCT 229 (or their equivalents);
   c. have a minimum GPR of 2.75 (overall, in major, and in CBK classes if applicable); and
   d. obtain approval of the department head and supervising professor.

2. For students who have completed 60 or more hours, you must:
   a. have completed a minimum of 12 hours at Texas A&M;
   b. have completed AGEC 105, either ECON 202 or ECON 203, MATH 141, MATH 142, AGEC 217 and ACCT 229 or ACCT 229 (or their equivalents);
   c. have a minimum GPR of 2.5 (overall, in major, and in CBK classes if applicable); and
   d. obtain approval of the department head and supervising professor.

Note: Please see an advisor to determine where internship and/or directed studies credit may be used on your degree plan.

Students also have the opportunity to participate in the Agricultural and Natural Resources Policy Internship program. This internship allows students to work a semester in Washington, D.C. with a member of the Texas delegation. To receive credit for this experience, the student must meet the following requirements:

1. have completed AGEC 105 or 3 hours of economics;
2. have a minimum GPR of 2.25 (overall, in major, and in CBK classes, if applicable);
3. be classified as a junior or senior; and
4. obtain approval from the department head and supervising professor.

Note: Please see an advisor to determine where internship and/or directed studies credit may be used on your degree plan.

All sophomore (200) through senior (400) level agricultural economics courses have prerequisites which are strictly enforced. Prerequisites are shown in the agricultural economics course description portion of this catalog. You may also find a list of agricultural economic course prerequisites on our website (http://agecon.tamu.edu/undergraduate/current-students/curriculum/courses). Prerequisites are subject to change and students should review the prerequisite list on our website before registering each semester.

Finance and Real Estate Option

The Finance and Real Estate option is designed to provide a well-founded basis in principles, concepts and methods for students interested in finance and/or real estate professional careers in the agricultural industry and/or related professions.

Program Requirements

First Year

Fall Semester Credit Hours
AGEC 105 Introduction to Agricultural Economics 3
AGLS 101 Modern Agricultural Systems and Renewable Natural Resources 1
ENGL 103 or ENGL 104 Introduction to Rhetoric and Composition or Composition and Rhetoric 3
MATH 141 Business Mathematics I 3
American history elective (p. 23) 1
### Technical agriculture elective

<table>
<thead>
<tr>
<th>Term</th>
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<tbody>
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<td>Language, philosophy and culture elective (p. 21)</td>
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### Second Year

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### General elective

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<td>AGEC 432 Rural Real Estate and Financial Analysis</td>
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<td>Directed non-agricultural economics elective</td>
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### Term Semester Credit Hours

- **Term**: Spring
- **Semester Credit Hours**: 16
- **Credit Hours**: 3

### Total Semester Credit Hours: 120

1. Students under ROTC contract, see Requirement 7 of the Requirements for a Baccalaureate Degree. (p. 25)
2. Any course offered by the College of Agriculture and Life Sciences, except 285s, 484s, 485s and agricultural economics courses.
3. The 6 hours of international and cultural diversity courses, as required for graduation, may be met in the curriculum. Students may select Language, Philosophy and Culture and Creative Arts elective that also meet the international and cultural diversity requirement.
4. All undergraduate students must take at least two (2) specific courses in their major designated as writing intensive (W). This course is an approved W course.
5. Six hours to be selected in one or more departments outside of the Department of Agricultural Economics. A minimum of 3 of these hours must be at the 300- or 400-level. To be selected in consultation with an advisor.
6. To be selected in consultation with an advisor.
7. Any Texas A&M or transfer course (except KINE 198 and KINE 199; STLC 001-STLC 003 (p. 993)) not used to meet other requirements.

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### Agricultural Economics - BS, Food Marketing Systems Option

The Bachelor of Science degree in Agricultural Economics offers students four options: Finance and Real Estate, Food Marketing Systems, Policy and Economic Analysis, and Rural Entrepreneurship. The course requirements for the freshman and sophomore years are the same for all Agricultural Economics options.

Requirements for graduation are listed in the Texas A&M University Student Rules and this catalog. With the exception of physical activity and general elective requirements, courses taken to satisfy degree requirements must be taken for letter grades.

The curriculum in Agricultural Economics is designed to train graduates for a wide variety of jobs in agriculturally-oriented business firms and agencies. Flexibility is included in the curriculum so that a student, in consultation with an academic advisor, can develop a degree program which best fits personal career objectives.

While not required on the degree plan, students are strongly encouraged to participate in internships (AGEC 484) to broaden their knowledge base and gain real-world experience to greater enhance employability after graduation. Students also have an opportunity to work one-on-one with a faculty member in a directed studies project. Directed studies projects (AGEC 485) enable students to receive additional instruction in areas of their career choice. To receive credit for AGEC 484 and/or AGEC 485 coursework, the student must meet the following requirements:
1. For Students who have completed between 30 and 59 hours total:
   a. have completed a minimum of 12 of those hours at Texas A&M
   b. have completed AGEC 105, either ECON 202 or ECON 203, MATH 141, MATH 142, AGEC 217 and ACCT 209 or ACCT 229 (or their equivalents);
   c. have a minimum GPR of 2.75 (overall, in major, and in CBK classes if applicable); and
   d. obtain approval of the department head and supervising professor.

2. For students who have completed 60 or more hours, you must:
   a. have completed a minimum of 12 hours at Texas A&M;
   b. have completed AGEC 105, either ECON 202 or ECON 203, MATH 141, MATH 142, AGEC 217 and ACCT 229 or ACCT 229 (or their equivalents);
   c. have a minimum GPR of 2.5 (overall, in major, and in CBK classes if applicable); and
   d. obtain approval of the department head and supervising professor.

Note: Please see an advisor to determine where internship and/or directed studies credit may be used on your degree plan.

Students also have the opportunity to participate in the Agricultural and Natural Resources Policy Internship program. This internship allows students to work a semester in Washington, D.C. with a member of the Texas delegation. To receive credit for this experience, the student must meet the following requirements:

1. have completed AGEC 105 or 3 hours of economics;
2. have a minimum GPR of 2.25 (overall, in major, and in CBK classes, if applicable); and
3. be classified as a junior or senior; and
4. obtain approval from the department head and supervising professor.

Note: Please see an advisor to determine where internship and/or directed studies credit may be used on your degree plan.

All sophomore (200) through senior (400) level agricultural economics courses have prerequisites which are strictly enforced. Prerequisites are shown in the agricultural economics course description portion of this catalog. You may also find a list of agricultural economic course prerequisites on our website (http://agecon.tamu.edu/undergraduate/current-students/curriculum/courses). Prerequisites are subject to change and students should review the prerequisite list on our website before registering each semester.

**Food Marketing Systems Option**

The Food Marketing Systems Option is designed to provide a well-founded basis in principles, concepts and methods for students interested in management, marketing, sales and related professional careers in the agricultural industry and/or related professions.

**Program Requirements**

### First Year

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<td>ENGL 104</td>
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#### Term Semester Credit Hours

**Spring**

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<td>Language, philosophy and culture elective (p. 21)</td>
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<td>Life and physical sciences elective (p. 20)</td>
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#### Term Semester Credit Hours

**Second Year**

#### Fall

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#### Term Semester Credit Hours

#### Spring

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<td>ECON 203</td>
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#### Term Semester Credit Hours

**Third Year**

#### Fall

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<td>ECON 323</td>
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<td>STAT 303</td>
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#### Term Semester Credit Hours

#### Spring

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<td>AGEC 340</td>
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#### Term Semester Credit Hours

**Fourth Year**

#### Fall

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</table>
Agricultural Policy
International Trade and Agriculture or International Agribusiness Marketing
Directed agricultural economics electives
General elective

Term Semester Credit Hours: 15
Spring
AGEC 430 or ECON 311
Macroeconomics of Agriculture or Money and Banking
AGEC 447 or AGEC 448
Food and Agricultural Price Analysis or Agricultural Commodity Futures
Directed agricultural economics elective
General elective

Term Semester Credit Hours: 13
Total Semester Credit Hours: 120

1 Students under ROTC contract, see Requirement 7 of the Requirements for a Baccalaureate Degree. (p. 25)
2 Any course offered by the College of Agriculture and Life Sciences, except 285s, 484s, 485s and agricultural economics courses.
3 The 6 hours of international and cultural diversity courses, as required for graduation, may be met in the curriculum. Students may select Language, Philosophy and Culture and Creative Arts elective that also meet the international and cultural diversity requirement.
4 All undergraduate students must take at least two (2) specific courses in their major designated as writing intensive (W). This course is an approved W course.
5 Six hours to be selected in one or more departments outside of the Department of Agricultural Economics. A minimum of 3 of these hours must be at the 300- or 400-level. To be selected in consultation with an advisor.
6 To be selected in consultation with an advisor.
7 Any Texas A&M or transfer course (except KINE 198 and KINE 199; STLC 001 - STLC 003 (p. 993)) not used to meet other requirements.
8 AGEC 447 is a fall only class. AGEC 448 is a spring only class.

Agricultural Economics - BS, Policy and Economic Analysis Option

The Bachelor of Science degree in Agricultural Economics offers students four options: Finance and Real Estate, Food Marketing Systems, Policy and Economic Analysis, and Rural Entrepreneurship. The course requirements for the freshman and sophomore years are the same for all Agricultural Economics options.

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   a. have completed a minimum of 12 of those hours at Texas A&M
   b. have completed AGEC 105, either ECON 202 or ECON 203, MATH 141, MATH 142, AGEC 217 and ACCT 209 or ACCT 229 (or their equivalents);
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2. For Students who have completed 60 or more hours, you must:
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Note: Please see an advisor to determine where internship and/or directed studies credit may be used on your degree plan.

Students also have the opportunity to participate in the Agricultural and Natural Resources Policy Internship program. This internship allows students to work a semester in Washington, D.C. with a member of the Texas delegation. To receive credit for this experience, the student must meet the following requirements:

1. have completed AGEC 105 or 3 hours of economics;
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4. obtain approval from the department head and supervising professor.

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Policy and Economic Analysis Option

The Policy and Economic Analysis Option is designed to provide a well-founded basis in principles, concepts and methods for students interested
in pursuing graduate study and/or law school following their graduation with a BS degree.

Program Requirements

First Year

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<td>AGLS 101</td>
<td>Modern Agricultural Systems and Renewable Natural Resources</td>
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<td>ENGL 103 or ENGL 104</td>
<td>Introduction to Rhetoric and Composition or Composition and Rhetoric</td>
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<td>MATH 141</td>
<td>Business Mathematics I</td>
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<td>Spring</td>
<td>MATH 142</td>
<td>Business Mathematics II</td>
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Second Year

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<th>Course Title</th>
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<td>Survey of Accounting Principles</td>
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<td>AGEC 217</td>
<td>Fundamentals of Agricultural Economics</td>
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<td>Spring</td>
<td>ACCT 210</td>
<td>Survey of Managerial and Cost Accounting Principles</td>
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Third Year

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<th>Credit Hours</th>
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<td>Marketing Agricultural and Food Products</td>
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<td>Agribusiness Management</td>
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<td>ECON 323</td>
<td>Microeconomic Theory</td>
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<td>Financial Management in Agriculture</td>
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<td>AGEC 429</td>
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| Fourth Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>Fall</td>
<td>AGEC 344 or AGEC 452</td>
<td>Food and Agricultural Law or International Trade and Agriculture</td>
<td>3</td>
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<tr>
<td></td>
<td>AGEC 447</td>
<td>Food and Agricultural Price Analysis</td>
<td>3</td>
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<td></td>
<td>Directed agricultural economics elective</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Directed non-agricultural economics elective</td>
<td>3</td>
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<tr>
<td></td>
<td>General elective</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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<tr>
<td>Spring</td>
<td>AGEC 350</td>
<td>Environmental and Natural Resource Economics</td>
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<tr>
<td></td>
<td>AGEC 430 or ECON 311</td>
<td>Macroeconomics of Agriculture or Money and Banking</td>
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<td>Directed agricultural economics elective</td>
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<td></td>
<td>General elective</td>
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</tbody>
</table>

Total Semester Credit Hours: 120

1. Students under ROTC contract, see Requirement 7 of the Requirements for a Baccalaureate Degree. (p. 25)
2. Any course offered by the College of Agriculture and Life Sciences, except 285s, 484s, 485s and agricultural economics courses.
3. The 6 hours of international and cultural diversity courses, as required for graduation, may be met in the curriculum. Students may select Language, Philosophy and Culture and Creative Arts elective that also meet the international and cultural diversity requirement.
4. All undergraduate students must take at least two (2) specific courses in their major designated as writing intensive (W). This course is an approved W course.
5. Six hours to be selected in one or more departments outside of the Department of Agricultural Economics. A minimum of 3 of these hours must be at the 300- or 400-level. To be selected in consultation with an advisor.
6. To be selected in consultation with an advisor.
7. Any Texas A&M or transfer course (except KINE 198 and KINE 199; STLC 001 - STLC 003 (p. 993)) not used to meet other requirements.

Agricultural Economics - BS, Rural Entrepreneurship Option

The Bachelor of Science degree in Agricultural Economics offers students four options: Finance and Real Estate, Food Marketing Systems, Policy and Economic Analysis, and Rural Entrepreneurship. The course
requirements for the freshman and sophomore years are the same for all Agricultural Economics options.

Requirements for graduation are listed in the Texas A&M University Student Rules and this catalog. With the exception of physical activity and general elective requirements, courses taken to satisfy degree requirements must be taken for letter grades.

The curriculum in Agricultural Economics is designed to train graduates for a wide variety of jobs in agriculturally-oriented business firms and agencies. Flexibility is included in the curriculum so that a student, in consultation with an academic advisor, can develop a degree program which best fits personal career objectives.

While not required on the degree plan, students are strongly encouraged to participate in internships (AGEC 484) to broaden their knowledge base and gain real-world experience to greater enhance employability after graduation. Students also have an opportunity to work one-on-one with a faculty member in a directed studies project. Directed studies projects (AGEC 485) enable students to receive additional instruction in areas of their career choice. To receive credit for AGEC 484 and/or AGEC 485 coursework, the student must meet the following requirements:

1. For Students who have completed between 30 and 59 hours total:
   a. have completed a minimum of 12 of those hours at Texas A&M;
   b. have completed AGEC 105, either ECON 202 or ECON 203, MATH 141, MATH 142, AGEC 217 and ACCT 209 or ACCT 229 (or their equivalents);
   c. have a minimum GPR of 2.75 (overall, in major, and in CBK classes if applicable); and
   d. obtain approval of the department head and supervising professor.

2. For students who have completed 60 or more hours, you must:
   a. have completed a minimum of 12 hours at Texas A&M;
   b. have completed AGEC 105, either ECON 202 or ECON 203, MATH 141, MATH 142, AGEC 217 and ACCT 229 or ACCT 229 (or their equivalents);
   c. have a minimum GPR of 2.5 (overall, in major, and in CBK classes if applicable); and
   d. obtain approval of the department head and supervising professor.

Note: Please see an advisor to determine where internship and/or directed studies credit may be used on your degree plan.

Students also have the opportunity to participate in the Agricultural and Natural Resources Policy Internship program. This internship allows students to work a semester in Washington, D.C. with a member of the Texas delegation. To receive credit for this experience, the student must meet the following requirements:

1. have completed AGEC 105 or 3 hours of economics;
2. have a minimum GPR of 2.25 (overall, in major, and in CBK classes, if applicable);
3. be classified as a junior or senior; and
4. obtain approval from the department head and supervising professor.

Note: Please see an advisor to determine where internship and/or directed studies credit may be used on your degree plan.

All sophomore (200) through senior (400) level agricultural economics courses have prerequisites which are strictly enforced. Prerequisites are shown in the agricultural economics course description portion of this catalog. You may also find a list of agricultural economic course prerequisites on our website (http://agecon.tamu.edu/undergraduate/current-students/curriculum/courses). Prerequisites are subject to change and students should review the prerequisite list on our website before registering each semester.

Rural Entrepreneurship Option

The Rural Entrepreneurship Option is designed to provide a well-founded basis in principles, concepts and methods for students interested in owning and/or managing or otherwise being engaged in working with a rural business.

Program Requirements

First Year

Fall Semester Credit Hours

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEC 105</td>
<td>Introduction to Agricultural Economics</td>
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<tr>
<td>AGLS 101</td>
<td>Modern Agricultural Systems and Renewable Natural Resources</td>
<td>1</td>
</tr>
<tr>
<td>ENGL 103 or</td>
<td>Introduction to Rhetoric and Composition</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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<tr>
<td>MATH 141</td>
<td>Business Mathematics I</td>
<td>3</td>
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<tr>
<td>American history elective (p. 23)</td>
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<tr>
<td>Technical agriculture elective</td>
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Term Semester Credit Hours 16

Spring Semester

<table>
<thead>
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<th>Title</th>
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<tbody>
<tr>
<td>MATH 142</td>
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<td>American history elective (p. 23)</td>
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<tr>
<td>Creative Arts elective (p. 22)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Language, philosophy and culture elective (p. 21)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Life and physical sciences elective (p. 20)</td>
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</table>

Term Semester Credit Hours 15

Second Year

Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>ACCT 209</td>
<td>Survey of Accounting Principles</td>
<td>3</td>
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<td>AGEC 217</td>
<td>Fundamentals of Agricultural Economics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 202</td>
<td>Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>Government/Political science elective (p. 23)</td>
<td>3</td>
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<tr>
<td>Life and physical sciences elective (p. 20)</td>
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Term Semester Credit Hours 15

Spring Semester

<table>
<thead>
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<th>Title</th>
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<tbody>
<tr>
<td>ACCT 210</td>
<td>Survey of Managerial and Cost Accounting Principles</td>
<td>3</td>
</tr>
<tr>
<td>ECON 203</td>
<td>Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>Communication elective (p. 20)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Government/Political science elective (p. 23)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Life and physical sciences elective (p. 20)</td>
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</table>

Term Semester Credit Hours 15

Third Year

Fall Semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
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</thead>
<tbody>
<tr>
<td>AGEC 314</td>
<td>Marketing Agricultural and Food Products</td>
<td>3</td>
</tr>
</tbody>
</table>

Term Semester Credit Hours 15
### College of Agriculture and Life Sciences

Agricultural Economics - 5-Year Bachelor of Science/Master of Public Service Administration

The Joint-Degree Program between the Department of Agricultural Economics and The Bush School of Government & Public Service allows undergraduate Agricultural Economics students to enter the Master of Public Service Program the beginning of their fourth year at Texas A&M University.

Agricultural Economics majors who have at least a 3.25 GPA and who will have completed all of their prerequisite courses and otherwise completed 94 hours by the fall of their fourth year will be eligible to apply for the five-year program during their junior year. Applicants to the five-year program will submit the same materials (including GRE scores) as other MPSA applicants, and those whose records are judged to be competitive by the mid-January deadline will be invited to attend the GBS Interview Conference Weekend in late February/early March. The admissions criteria for the five-year program will be the same as for other MPSA students.

Students who choose not to finish the MPSA degree after being admitted to the five-year program may exit the program at any time. Completed MPSA courses will be applied to their bachelor’s degree in Agricultural Economics, and students will select the Agricultural Economics option area that is most appropriate for their interest. Failure to complete the MPSA program will in no way impede their ability to attain a bachelor’s degree in Agricultural Economics when the requirements for that degree are completed.

Advising for the five-year program will involve a coordinated effort by the Undergraduate Program Office in the Department of Agricultural Economics and the Director of the MPSA program in the Bush School. Advising by the Department of Agricultural Economics will help ensure that interested students have satisfied the prerequisite course requirements for their bachelor’s degree by the beginning of their senior year. The MPSA director and GBS director of recruiting will also be available for agricultural economics students who wish to set up appointments to talk individually about the MPSA program’s curriculum and career opportunities available to its graduates.

Students admitted into the five-year program (having completed a minimum of 103 credit hours toward their bachelor’s degree) will be enrolled in Bush School graduate courses with an undergraduate classification (U4) for the fall of their fourth year and will be reclassified as degree-seeking master’s degree students (G7) upon completing 116 credit hours. This will normally occur at the beginning of the spring semester of their fourth year.

Students in the five-year program will be required to complete the same two-year, 48-hour curriculum as other students admitted to the Bush School’s MPSA program. The curriculum combines nine core courses in public management, policy analysis, economics and research methods with seven electives.

A professional internship is also required and must be completed in the summer between the first and second years at the Bush School for those without substantive professional experience.

#### Program Requirements

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
<th>Term</th>
<th>Semester Credit Hours</th>
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<td>Fourth Year</td>
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<td>Spring</td>
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<td>Fall</td>
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<td>Winter</td>
<td>7</td>
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</table>

1. Students under ROTC contract, see Requirement 7 of the Requirements for a Baccalaureate Degree. (p. 25)
2. Any course offered by the College of Agriculture and Life Sciences, except 285s, 484s, 485s and agricultural economics courses.
3. The 6 hours of international and cultural diversity courses, as required for graduation, may be met in the curriculum. Students may select Language, Philosophy and Culture and Creative Arts elective that also meet the international and cultural diversity requirement.
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7. Any Texas A&M or transfer course (except KINE 198 and KINE 199; STLC 001 - STLC 003 (p. 993)) not used to meet other requirements.
### First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td><strong>AGEC 105</strong> Introduction to Agricultural Economics</td>
<td>3</td>
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<tr>
<td>ENGL 103 or</td>
<td>3</td>
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<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Business Mathematics I</td>
</tr>
<tr>
<td>American History (p. 23)</td>
<td>2</td>
</tr>
<tr>
<td>Life and physical sciences elective (p. 20)</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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<table>
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<tr>
<th>Spring</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>MATH 142</td>
<td>Business Mathematics II</td>
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<td>Communication (p. 20)</td>
<td>3</td>
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<tr>
<td>Life and physical sciences elective (p. 20)</td>
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<tr>
<td>Creative arts elective (p. 22)</td>
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### Second Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>ECON 202</td>
<td>Principles of Economics</td>
</tr>
<tr>
<td>AGE 217</td>
<td>Fundamentals of Agricultural Economics Analysis</td>
</tr>
<tr>
<td>ACCT 209</td>
<td>Survey of Accounting Principles</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
</tr>
<tr>
<td>Language, philosophy and culture elective (p. 21)</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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<table>
<thead>
<tr>
<th>Spring</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 203</td>
<td>Principles of Economics</td>
</tr>
<tr>
<td>ACCT 210</td>
<td>Survey of Managerial and Cost Accounting Principles</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
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<td>STAT 303</td>
<td>Statistical Methods</td>
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<tbody>
<tr>
<td>AGE 314</td>
<td>Marketing Agricultural and Food Products</td>
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<tr>
<td>Directed non-agricultural economics elective</td>
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</table>

Select one of the following:

- **ECMT 461** Economic Data Analysis
- **ECON 433** Energy Markets and Policy
- **ESSM 406** Natural Resources Policy
- **FSTC 444** Fundamentals of Food Law
- **GEOG 330** Resources and the Environment or
- **GEOG 430** Environmental Justice
- **GEOS 430** Global Science and Policy Making
- **MKTG 409** Principles of Marketing
- **POLS 340** Introduction to Public Administration
- **POLS 364** Global Political Thought
- **POLS 412** International Political Economy
- **POLS 415** Contemporary Issues in American Foreign Policy
- **POLS 439** Foreign Policy Decision Making
- **POLS 440** Public Policies and Policymaking
- **POLS 447 or** National Security Policy or Government and
- **POLS 475** the Economy
- **URPN 360** Issues in Environmental Quality

### Third Year

<table>
<thead>
<tr>
<th>Fall</th>
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<tbody>
<tr>
<td>ECON 323</td>
<td>Microeconomic Theory</td>
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<tr>
<td>AGE 330</td>
<td>Agribusiness Management</td>
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<td>AGE 340</td>
<td>Agribusiness Management</td>
</tr>
<tr>
<td>AGE 349</td>
<td>Agricultural Policy</td>
</tr>
<tr>
<td>AGE 452 or</td>
<td>International Trade and Agriculture or</td>
</tr>
<tr>
<td>AGE 453</td>
<td>International Agribusiness Marketing</td>
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<tr>
<td>Directed agricultural economics elective</td>
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<tr>
<td><strong>Term Semester Credit Hours</strong></td>
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<table>
<thead>
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<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>AGE 317</td>
<td>Economic Analysis for Agribusiness Management</td>
</tr>
<tr>
<td>AGE 344</td>
<td>Food and Agricultural Law</td>
</tr>
<tr>
<td>AGE 350</td>
<td>Environmental and Natural Resource Economics</td>
</tr>
<tr>
<td>AGE 430 or</td>
<td>Macroeconomics of Agriculture or Money and Banking</td>
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<tr>
<td>ECON 311</td>
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<tr>
<td>AGE 481</td>
<td>Ethics in Agribusiness and Agricultural Economics</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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<tr>
<th>Summer</th>
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<tbody>
<tr>
<td>Directed non-agricultural economics elective</td>
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Select one from the following:

- **ECMT 461** Economic Data Analysis
- **ECON 433** Energy Markets and Policy
- **ESSM 406** Natural Resources Policy
- **FSTC 444** Fundamentals of Food Law
- **GEOG 330** Resources and the Environment or
- **GEOG 430** Environmental Justice
- **GEOS 430** Global Science and Policy Making
- **MKTG 409** Principles of Marketing
- **POLS 340** Introduction to Public Administration
- **POLS 364** Global Political Thought
- **POLS 412** International Political Economy
- **POLS 415** Contemporary Issues in American Foreign Policy
- **POLS 439** Foreign Policy Decision Making
- **POLS 440** Public Policies and Policymaking
- **POLS 447 or** National Security Policy or Government and
- **POLS 475** the Economy
- **URPN 360** Issues in Environmental Quality
### College of Agriculture and Life Sciences

**WGST 430/ MGMT 430**  
Employment Discrimination Law  

### Fourth Year  
**Fall**  
<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>General electives</td>
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</table>

- **BUSH 631**  
Quantitative Methods in Public Management I  
- **PSAA 601**  
Foundations of Public Service  
- **PSAA 621 or ECON 607**  
Economic Analysis or Foundations of Microeconomic Theory  
- **PSAA 622**  
Public Finance  
- **PSAA 635**  
Social Welfare and Health Policy  

### Term Semester Credit Hours  
3  

### Spring  
**AGEC elective 600-level**  
3  
Select one of the following:  
- **AGEC 604/ PSAA 663**  
Natural Resource Economics  
- **AGEC 606**  
Water Resource Economics  
- **AGEC 607**  
Research Methodology  
- **AGEC 610**  
Economics of Biosecurity  
- **AGEC 614**  
Global Food and Agribusiness Policy  
- **AGEC 633**  
Sustainability in World Development  
- **AGEC 652**  
International Agribusiness Trade Analysis  

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td><strong>Summer</strong></td>
<td>3</td>
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</tbody>
</table>

### Agricultural Economics - Minor

The minor in Agricultural Economics is available to all students enrolled at Texas A&M University. The primary educational objective of this minor program is to provide students, majoring in other fields, with a fundamental knowledge of the fields of agricultural economics. The courses required for this minor will cover the major business elements of the agricultural industry.

#### Program Requirements

##### Core Courses

- **AGEC 105**  
Introduction to Agricultural Economics  
3  
- **AGEC 314**  
Marketing Agricultural and Food Products  
3  
- **AGEC 330**  
Financial Management in Agriculture  
3  
- **AGEC 340**  
Agribusiness Management  
3  

##### Electives

Upper-level AGEC courses (p. 605)  
6  

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
</table>

| Total Semester Credit Hours | 18 |

1. The following courses will not count toward the 6 hours of electives:  
AGEC 481, AGEC 484, and AGEC 485. Students are encouraged to visit the Agricultural Economics advisors to select the elective courses based on their career interests.

Students must make a grade of "C" or better in all courses.

### Financial Planning - Minor

The minor in Financial Planning prepares students for leadership roles in this growing profession. Financial planners advise their clients about financial decisions, including budget management, insurance, investment, taxes, retirement and estate planning. Their goal is to assist clients in achieving their financial goals in an increasingly complex economy. The six-course curriculum (18 credit hours) also satisfies the educational requirements to be eligible to sit for the exam portion of the CERTIFIED FINANCIAL PLANNER™ (CFP®) designation conferred by the CFP Board of Standards (http://www.cfp.net). Professionals who have earned this designation are in high demand in the financial services sector.

The minor in Financial Planning is available to all junior or senior undergraduate students enrolled at Texas A&M University, who have completed an introductory finance course and have an overall GPA of 2.5 or higher. Successful completion of the minor requires the courses to be taken for academic credit with a grade of C or better for each course. Coursework is offered both online and in the classroom to meet students'
learning preferences. Visit our website (http://financialplanning.tamu.edu) for more information about this minor and the career opportunities in Financial Planning.

Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>AGEC 435</td>
<td>Financial Planning for Professionals</td>
<td>3</td>
</tr>
<tr>
<td>AGEC 436</td>
<td>Insurance and Estate Planning</td>
<td>3</td>
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<tr>
<td>AGEC 437</td>
<td>Tax Planning</td>
<td>3</td>
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<tr>
<td>AGEC 438</td>
<td>Investment Planning</td>
<td>3</td>
</tr>
<tr>
<td>AGEC 439</td>
<td>Retirement Planning</td>
<td>3</td>
</tr>
<tr>
<td>AGEC 441</td>
<td>Financial Planning Capstone</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 18

Students must make a grade of "C" or better in all courses.

Students must have completed an introductory finance course and have an overall GPA of 2.5 or higher.

International Trade and Agriculture - Certificate

Open to All Majors

The Certificate in International Trade and Agriculture (CITA), offered by the Department of Agricultural Economics, is designed to provide students with a complete knowledge and understanding of the global forces shaping change in agriculture. The CITA is available to all students provided that all prerequisites are met. The program requires a minimum of 15 credit hours in designated courses. Also, students must earn a grade of "C" or better in each course used to meet CITA requirements. Students who pursue the CITA must complete all requirements prior to graduation. Specific certificate requirements are available in the Undergraduate Programs Office, Room 214 of the Agriculture and Life Sciences Building, of the Department of Agricultural Economics or at http://agecon.tamu.edu/undergraduate/current-students/curriculum/certificate/

Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEC 452</td>
<td>International Trade and Agriculture</td>
<td>3</td>
</tr>
<tr>
<td>or AGEC 453</td>
<td>or International Agribusiness Marketing</td>
<td></td>
</tr>
</tbody>
</table>

Select twelve hours from the following: 12

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEC 429</td>
<td>Agricultural Policy</td>
<td></td>
</tr>
<tr>
<td>AGEC 452</td>
<td>International Trade and Agriculture</td>
<td></td>
</tr>
<tr>
<td>AGEC 453</td>
<td>International Agribusiness Marketing</td>
<td></td>
</tr>
<tr>
<td>ECON 330</td>
<td>Economic Development</td>
<td></td>
</tr>
<tr>
<td>ECON 410</td>
<td>Macroeconomic Theory</td>
<td></td>
</tr>
<tr>
<td>ECON 452</td>
<td>International Trade Theory and Policy</td>
<td></td>
</tr>
<tr>
<td>GEOG 202</td>
<td>Geography of the Global Village</td>
<td></td>
</tr>
<tr>
<td>GEOG 320</td>
<td>The Middle East</td>
<td></td>
</tr>
<tr>
<td>GEOG 323</td>
<td>Geography of Latin America</td>
<td></td>
</tr>
<tr>
<td>MGMT 450/IBUS</td>
<td>International Environment of Business</td>
<td></td>
</tr>
<tr>
<td>MGMT 450</td>
<td>International Management</td>
<td></td>
</tr>
<tr>
<td>MGMT 452/IBUS</td>
<td>International Management</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 15

Study abroad, foreign languages, and international internships are encouraged and allowed to contribute toward the 15 hours required for the certificate. No more than three hours of foreign language or six hours of study abroad or six hours of international internship may be counted as credit toward the certificate.

Department of Agricultural Leadership, Education, and Communications

The Department of Agricultural Leadership, Education, and Communications (ALEC) includes a student-centered faculty and staff offering undergraduate and graduate degrees leading to professional careers. Undergraduate programs in ALEC offer a unique combination of practical, hands-on skills and the critical people skills required for success in today’s fast-moving careers. ALEC graduates are uniquely equipped for leadership, education, communications, and training roles in the broad field of agricultural sciences and human performance in both domestic and international settings. ALEC offers four Bachelor of Science degrees: Agricultural Communications and Journalism, Agricultural Leadership and Development, Agricultural Science, and University Studies-Leadership Studies; and three minors: Agricultural Communications and Journalism, International Agricultural Development, and Leadership.

Faculty

Archer, Holli R, Assistant Professor
Ag Leadership, Educ & Comm
PhD, Texas A&M University, 2013

Bobbitt, Erica M, Assistant Lecturer
Ag Leadership, Educ & Comm
PhD, Pennsylvania State University, 2011

Boyd, Barry L, Associate Professor
Ag Leadership, Educ & Comm
PhD, Texas A&M University, 1991

Briers, Gary E, Professor
Ag Leadership, Educ & Comm
PhD, Iowa State University, 1978

Cummings, Scott R, Professor & Extension Specialist
Ag Leadership, Educ & Comm
PhD, University of Texas Health Science Center at Houston, 1995

Dodd, Courtney F, Assistant Professor & Extension Specialist
Ag Leadership, Educ & Comm
PhD, Texas A&M University, 2013
Dromgoole, Darrell A, Associate Professor & Extension Specialist  
Ag Leadership, Educ & Comm  
EDD, Texas A&M University, 2007

Dunsford, Deborah W, Senior Lecturer  
Ag Leadership, Educ & Comm  
PhD, Texas A&M University, 1993

Edney, Kirk C, Continuing Education Assistant Professor  
Ag Leadership, Educ & Comm  
PhD, Texas A&M University, 2009

Elbert, Chanda D, Associate Professor  
Ag Leadership, Educ & Comm  
PhD, Pennsylvania State University, 2000

Felton Odom, Summer R, Assistant Professor  
Ag Leadership, Educ & Comm  
PhD, Texas A&M University, 2011

Hanagriff, Roger D, Continuing Education Assistant Professor  
Ag Leadership, Educ & Comm  
PhD, Texas A&M University, 2002

Hancock, Jay P, Assistant Lecturer  
Ag Leadership, Educ & Comm  
MS, Texas A&M University, 1984

Harlin, Julie F, Associate Professor  
Ag Leadership, Educ & Comm  
PhD, Oklahoma State University, 1999

Lindner, James R, Professor  
Ag Leadership, Educ & Comm  
PhD, Ohio State University, 2000

Lockett, Landry L, Senior Lecturer  
Ag Leadership, Educ & Comm  
EDD, Texas A&M University, 2007

McGrath, Paul A, Assistant Lecturer  
Ag Leadership, Educ & Comm  
MA, Marist College, 2012

McKim, Billy R, Assistant Professor  
Ag Leadership, Educ & Comm  
PhD, Texas A&M University, 2010

Moore, Lori L, Associate Professor  
Ag Leadership, Educ & Comm  
PhD, University of Florida, 2003

Murphey, Theresa P, Associate Professor  
Ag Leadership, Educ & Comm  
PhD, Texas A&M University, 1997

Murphy, Timothy H, Professor  
Ag Leadership, Educ & Comm  
PhD, Texas A&M University, 1995

Pina, Manuel, Associate Professor  
Ag Leadership, Educ & Comm  
PhD, Texas A&M University, 1978

Rayfield, John S, Associate Professor  
Ag Leadership, Educ & Comm  
EdD, Texas Tech University, 2006  
PhD, Texas Tech University, 2006

Redwine, Tobin D., Assistant Professor  
Ag Leadership, Educ & Comm  
PhD, Texas A&M University, 2014

Rutherford, Tracy A, Professor  
Ag Leadership, Educ & Comm  
PhD, University of Florida, 2010

Strong Jr, Robert L, Assistant Professor  
Ag Leadership, Educ & Comm  
PhD, Oklahoma State University, 2007

Vestal, Tom A, Professor & Extension Specialist  
Ag Leadership, Educ & Comm  
PhD, Texas A&M University, 1998

Wingenbach, Gary J, Professor  
Ag Leadership, Educ & Comm  
PhD, Iowa State University, 1995

Majors

- Bachelor of Science in Agricultural Communications and Journalism (p. 119)
- Bachelor of Science in Agricultural Leadership and Development (p. 120)
- Bachelor of Science in Agricultural Science Teaching (p. 121)
- Bachelor of Science in University Studies, Leadership Studies Concentration (p. 122)

Minors

- Agricultural Communications and Journalism Minor (p. 122)
- International Agricultural Development Minor (p. 123)
- Leadership Minor (p. 123)

Agricultural Communications and Journalism - BS

Curriculum in Agricultural Communications and Journalism is administered by the Department of Agricultural Leadership, Education, and Communications. Graduates are employed by agricultural businesses, industries and associations; by agriculture-related organizations; by government agencies at all levels; and by all types of communication media: magazines, the Internet, television and radio stations, newspapers, and public relations and advertising agencies.

Students who wish to develop specific career plans may do so in consultation with their Agricultural Communications and Journalism advisor. With approval of the advisor and the dean’s office, substitutions may be made in the required scientific and technical agriculture courses to help meet the student’s goals.
Students are expected to be proficient in the use of computer keyboards for writing.

**Program Requirements**

**AGCJ 105** Introduction to Agricultural Communications 3

**AGCJ 281** Journalism Concepts for Agriculture 3

**AGCJ 307** Design for Agricultural Media 3

**AGCJ 312** Editing for Agricultural Audiences 3

**AGCJ 313** Agricultural Media Writing I 3

**AGCJ 314** Agricultural Media Writing II 3

**AGCJ 481** Senior Seminar 3

Agricultural Communications and Journalism Core electives 6

Select two of the following:

- **AGCJ 305** Theory and Practice of Agricultural Publishing
- **AGCJ 306** Theory and Practice of Agricultural Public Relations
- **AGCJ 308** Agricultural Photography
- **AGCJ 366** Radio Broadcasting
- **AGCJ 380** Workshop in Agricultural Communications and Journalism

Agricultural Communications and Journalism Professional Skills 9

Select three of the following:

- **AGCJ 404** Communicating Agricultural Information to the Public
- **AGCJ 405** Agricultural Publications Production
- **AGCJ 406** Agricultural Public Relations Methods
- **AGCJ 407** Web Authoring in Agricultural Communication
- **AGCJ 409** Television Production for Agricultural Journalists
- **AGCJ 485** Directed Studies
- **AGCJ 494** Internship

Agricultural business directed elective 3

Select one of the following:

- **AGEC 105** Introduction to Agricultural Economics
- **AGEC 314** Marketing Agricultural and Food Products
- **AGEC 315** Food and Agricultural Sales
- **AGEC 340** Agribusiness Management

Animal science directed elective 3

Select one of the following:

- **ANSC 107** General Animal Science
- **ANSC 108** General Animal Science
- **DASC 202** Dairying
- **ENTO 201** General Entomology
- **ENTO 208** Veterinary Entomology
- **POSC 201** General Avian Science
- **WFSC 301** Wildlife and the Changing Environment
- **WFSC 304** Wildlife and Fisheries Conservation

Plant science directed elective 3

Select one of the following:

- **SCSC 105** World Food and Fiber Crops
- **SCSC 302** Recreational Turf
- **HORT 301** Garden Science
- **PLPA 301** Plant Pathology
- **ESSM 203** Forest Trees of North America
- **ESSM 301** Wildland Watershed Management

**ESSM 302** Wildland Plants of North America

**ESSM 314** Principles of Rangeland Management Around the World

Human performance directed elective 3

Select one of the following:

- **ALEC 304** Survey of Leadership Theory
- **ALEC 440** Leading Change
- **NUTR 202** Fundamentals of Human Nutrition
- **NUTR 430** Community Nutrition
- **FSTC 201** Food Science

Agricultural electives 16

General electives 1

American history electives (p. 23) 6

POLS 206 American National Government 3

POLS 207 State and Local Government 3

Communication electives (p. 20) 6

Creative arts elective (p. 22) 3

Language, philosophy and culture elective (p. 21) 3

Life and physical sciences electives (p. 20) 9

Mathematics electives (p. 20) 6

Select one course from the following:

- **STAT 201-STAT 225** (p. 990)
- **STAT 301-STAT 415** (p. 990)

**Total Semester Credit Hours** 120

1 All agricultural electives will be used to develop a cohesive career emphasis and are to be selected in consultation with an advisor.

The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement.

**Agricultural Leadership and Development - BS**

Agricultural Leadership and Development is administered by the Department of Agricultural Leadership, Education, and Communications. It prepares students to work with people involved in agriculture and life sciences. The curriculum emphasizes the development of leadership capabilities, communication skills, and broad preparation in life sciences. The curriculum in agricultural leadership and development is multidisciplinary, designed to develop students for leadership positions in local, state, regional, and national groups, organizations, and agencies that are involved in the agricultural industry. The degree requires a 15-18 hour university approved minor that serves as a context for students to apply their leadership knowledge.

**Program Requirements**

**ALEC 201** Foundations of Agricultural Leadership, Education and Communications 2

**ALEC 202** Introduction to Leadership 3

**ALEC 301** Personal Leadership Education 3

**ALEC 340** Survey of Leadership Theory 3

**ALEC 424** Applied Ethics in Leadership 3
The Agricultural Science curriculum is designed to offer the student a combination of courses in scientific agriculture and in professional education that will meet requirements for employment and advanced study in different careers in which the emphasis is on formal and informal programs of education. Such careers may include teaching agricultural science in high schools, area career and technology schools and community colleges; working as an agricultural extension agent; working as an agricultural representative for a marketing agency, an agricultural supply company or other industries related to agriculture; and serving as an agricultural development consultant in an international program.

A student majoring in agricultural science will be counseled by an advisor in the Department of Agricultural Leadership, Education, and Communications to ensure that the program developed with the student will satisfy his or her unique interests, needs and professional aspirations. A combination of courses in scientific agriculture, education and general studies provides students with a knowledge of scientific agriculture and the ability to work with and influence people. Flexibility in course selection allows a student to place emphasis on a particular field of agriculture or to prepare broadly in agricultural studies. This flexibility might prepare a student to teach in a particular school setting, focusing upon a certain curriculum (e.g., horticulture, animal science and agricultural business).

Many aspects of the practice of agriculture are learned through experience. Enrollment in high school agricultural science and participation in FFA and/or 4-H are encouraged and recommended, but not required.

A student following this curriculum may be eligible to enter public schools as a teacher of agricultural science under the Texas Education Agency. Off-campus student teaching is required.

**Program Requirements**

**AGEC 105** Introduction to Agricultural Economics 3
or **ECON 202/203** Principles of Economics

Select one of the following:

- **AGEC 314** Marketing Agricultural and Food Products
- **AGEC 315** Food and Agricultural Sales
- **AGEC 325** Principles of Farm and Ranch Management
- **AGEC 340** Agribusiness Management

**AGLS 101** Modern Agricultural Systems and Renewable Natural Resources 1

**AGSC 301** Introduction to Agricultural Science Teaching 3

**AGSC 384** Clinical Professional Experience in AGSC 3

**AGSC 402** Designing Instruction for Secondary Agricultural Science Programs 3

**AGSC 405** Facilitating Complete Secondary Agricultural Science Programs 3

**AGSC 425** Learner Centered Instruction in Agricultural Science 3

**AGSC 436** Professional Teaching Internship in AGSC 6

**AGSC 481** Seminar 1

**AGSC 484** Field Experience 4

Select one of the following:

- **ANSC 107** General Animal Science
- **DASC 202** Dairying
- **POSC 201** General Avian Science
- **ANSC 320** Animal Nutrition and Feeding
### Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tr>
<td>ALEC 201</td>
<td>Foundations of Agricultural Leadership, Education and Communications</td>
<td>2</td>
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<tr>
<td>ALED 202</td>
<td>Introduction to Leadership</td>
<td>3</td>
</tr>
<tr>
<td>ALED 301</td>
<td>Personal Leadership Education</td>
<td>3</td>
</tr>
<tr>
<td>ALED 340</td>
<td>Survey of Leadership Theory</td>
<td>3</td>
</tr>
<tr>
<td>ALED 424</td>
<td>Applied Ethics in Leadership</td>
<td>3</td>
</tr>
<tr>
<td>ALED 440</td>
<td>Leading Change</td>
<td>3</td>
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<td>ALED 481</td>
<td>Seminar</td>
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<td>Agricultural leadership and development electives (p. 617)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>American history (p. 23)</td>
<td>6</td>
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<td></td>
<td>POLS 206</td>
<td>American National Government</td>
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<tr>
<td>&amp; POLS 207</td>
<td>and State and Local Government</td>
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<td>Communication (p. 20)</td>
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<td>Creative arts (p. 22)</td>
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<td>Language, philosophy and culture (p. 21)</td>
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<td>Life and physical sciences (p. 20)</td>
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<td>Mathematics (p. 20)</td>
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<td>Plant science electives</td>
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<td></td>
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<td>11</td>
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<tr>
<td></td>
<td>Electives 2,3</td>
<td>3</td>
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</tbody>
</table>

**Total Semester Credit Hours**: 120

1. Professional development courses required for certification as a teacher of agricultural science.
2. In order to be eligible for student teaching, the AGSC major requires a 2.75 GPA.
3. Restricted electives in scientific agriculture are required for teacher certification by the Texas Education Agency. A minimum of 24 semester hours of scientific agriculture must be at the 300- and 400-level.

The Graduation requirements include a requirement for six hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement.

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### University Studies - BS, Leadership Studies Concentration

A University Studies Degree is an interdisciplinary major that consists of a concentration of 26 hours and two minors of 15-18 hours each. The University Studies Degree format was created to provide students the flexibility to combine areas of study that are of special interest.

University Studies - Leadership Studies is administered by the Department of Agricultural Leadership, Education, and Communications. In the leadership studies concentration, students learn theories and models of the leadership process and they use analysis and evaluation to synthesize multiple leadership theories. This interdisciplinary program allows you the ability to customize your higher educational experience to your future career goals unlike any other degree at Texas A&M University.

This innovative degree empowers you to develop an understanding of foundational leadership theory in your chosen context. The student, with support from the advisor, will choose minors to assist them in creating a degree plan that will allow students to gain the knowledge and skills required for their chosen career path.

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### Agricultural Communications and Journalism - Minor

Students in the College of Agriculture and Life Sciences seeking a minor in Agricultural Communications and Journalism should begin the process by discussing the option with their academic advisor in their major.

Students should then make an appointment with an advisor in Agricultural Communications and Journalism to discuss their interests. An application is required for establishing a minor in Agricultural Communications and Journalism.

Agricultural Communications and Journalism is highly focused on written communication. Interested students should consider their interest in writing before beginning the minor.
Program Requirements

AGCJ 105 Introduction to Agricultural Communications 3
AGCJ 312 Editing for Agricultural Audiences 3
AGCJ 313 Agricultural Media Writing I 3
AGCJ 314 Agricultural Media Writing II 3
Select one of the following: 3
   AGCJ 305 Theory and Practice of Agricultural Publishing
   AGCJ 306 Theory and Practice of Agricultural Public Relations
   AGCJ 307 Design for Agricultural Media
Select one of the following: 3
   AGCJ 405 Agricultural Publications Production
   AGCJ 406 Agricultural Public Relations Methods
   AGCJ 407 Web Authoring in Agricultural Communication

Total Semester Credit Hours 18

Students must make a grade of "C" or better in all courses.

International Agricultural Development - Minor

The minor in International Agricultural Development provides students with formal instruction in international development concepts and practical experiences through language acquisition, study/research abroad, and/or international fieldwork. The 18-hour curriculum prepares students for successful post-baccalaureate international careers, or graduate studies, particularly aligned with the International Agriculture and Resource Management (IARM) Graduate Certificate Program, in partnership with the Norman Borlaug Institute for International Agriculture. Students critically examine current international agricultural issues and/or diversity and communications. Coursework includes 12 credits of foundational concepts and six hours of upper-division foreign languages or approved international experiences. Students must have a declared major, a GPR of 2.0 or higher, and have completed less than 75 hours at time of application. Before being accepted into the minor, students must meet with an IDAG advisor and complete an application.

Program Requirements

AGCJ 491 Research 3
Select three of the following: 9
   ALEC 350 Global Agricultural Issues
   ALEC 450 Global Social Justice Issues in Agriculture
   ALED 422 Cultural Pluralism in Agriculture
   ALED 442 Professional Communications in Agriculture and Life Sciences
Practical Skills/Experiences: Upper-division, university-level foreign languages; or IDAG advisor approved international experiences 6

Total Semester Credit Hours 18

1 Or other advisor approved ALED (p. 617) elective

Department of Animal Science

The curricula in Animal Science are designed to prepare students for rewarding careers in animal-oriented agribusiness. The millions of domestic animals that provide food, fiber and recreation for humans offer a variety of career opportunities for animal science graduates.

Students completing the Bachelor of Science degree in Animal Science are in demand by both the private and public sectors. Career paths include livestock production and the extensive infrastructure that provides the products and services required for management, marketing and processing of livestock and livestock products. Students receive training in nutrition, breeding, reproductive physiology, meat science, dairy products, wool and mohair, and the production and management of livestock. Extensive laboratory facilities and livestock operations located on or near campus in the Animal Science Teaching, Research and Extension Complex facilitate practical application of the scientific principles.

Leadership skills are developed through participation in a wide array of extracurricular activities, including departmental clubs, judging teams and continuing education/youth programs. A substantial number of students gain experience in a variety of disciplines through high impact learning experiences such as internships, research, study abroad and field trips.

Faculty

Acuff, Gary R, Professor
Animal Science
PhD, Texas A&M University, 1985
Banta, Jason P, Associate Professor & Extension Specialist
Animal Science
BS, Texas A&M University, 1999

Bazer, Fuller W, Distinguished Professor
Animal Science
PhD, North Carolina State University, 1969

Carstens, Gordon E, Professor
Animal Science
PhD, Colorado State University, 1998

Castillo, Alejandro, Associate Professor
Animal Science
PhD, Texas A&M University, 1998

Cleere, Jason J, Associate Professor & Extension Specialist
Animal Science
PhD, Texas Tech University, 2002

Coverdale, Josie A, Associate Professor
Animal Science
PhD, Iowa State University, 2003

Cross, H Russell, Professor
Animal Science
PhD, Texas A&M University, 1972

Dunlap, Kathrin A, Assistant Professor
Animal Science
PhD, Texas A&M University, 2006

Forrest, David W, Professor
Animal Science
PhD, University of Wyoming, 1979

Friend, Theodore H, Professor
Animal Science
PhD, Virginia Tech, 1977

Garcia, Leslie L, Assistant Lecturer
Animal Science
MS, Tarleton State University, 2010

Gehring, Kerri B, Associate Professor
Animal Science
PhD, Texas A&M University, 1994

Gill, Clare A, Professor
Animal Science
PhD, University of Adelaide, Australia, 2000

Gill, Jason J, Assistant Professor
Animal Science
PhD, University of Guelph, 2006

Griffin, Davey B, Professor & Extension Specialist
Animal Science
PhD, Texas A&M University, 1989

Heird, James C, Executive Professor
Animal Science
PhD, Texas Tech University, 1978

Herring, Andy D, Professor
Animal Science
PhD, Texas A&M University, 1994

Ing, Nancy H, Associate Professor
Animal Science
PhD, University of Florida, 1988

Kerth, Christopher R, Associate Professor
Animal Science
PhD, Texas Tech University, 1999

Mies, William L, Visiting Professor
Animal Science
PhD, University of Missouri, 1971

Miller, Rhonda K, Professor
Animal Science
PhD, Colorado State University, 1983

Osburn, Wesley N, Associate Professor
Animal Science
PhD, University of Nebraska, 1996

Paulk, Chad, Assistant Professor
Animal Science
PhD, Kansas State University, 2014

Poe, Allen B, Lecturer
Animal Science
MED, Texas A&M University, 2003

Ramsey, W S, Professor
Animal Science
PhD, New Mexico State University, 1996

Randel, Ronald D, Professor
Animal Science
PhD, Purdue University, 1971

Riggs, Penny K, Associate Professor
Animal Science
PhD, Texas A&M University, 1996

Riley, David G, Associate Professor
Animal Science
PhD, Texas A&M University, 2000

Sanders, James O, Professor
Animal Science
PhD, Texas A&M University, 1977

Satterfield, Michael C, Associate Professor
Animal Science
PhD, Texas A&M University, 2008

Savell, Jeffrey W, Professor
Animal Science
PhD, Texas A&M University, 1978

Sawyer, Jason E, Associate Professor
Animal Science
PhD, New Mexico State University, 2000
Sigler, Dennis H, Professor & Extension Specialist
Animal Science
PhD, Texas A&M University, 1981

Skaggs, Chris L, Professor
Animal Science
PhD, Iowa State University, 1992

Smith, Gary C, Visiting Professor
Animal Science
PhD, Texas A&M University, 1968

Smith, Stephen B, Professor
Animal Science
PhD, University of California, Davis, 1980

Taylor, Thomas M, Associate Professor
Animal Science
PhD, University of Tennessee, 2006

Tedeschi, Luis O, Professor
Animal Science
PhD, Cornell University, 2001

Tomaszewski, Michael A, Visiting Professor
Animal Science
PhD, North Carolina State University, 1972

Vogelsang, Martha M, Senior Lecturer
Animal Science
PhD, Texas A&M University, 1986

Welsh, Thomas H, Professor
Animal Science
PhD, North Carolina State University, 1980

Wickersham, Tryon A, Associate Professor
Animal Science
PhD, Kansas State University, 2006

Williams, Gary L, Professor
Animal Science
PhD, University of Arizona, The, 1978

Wu, Guoyao, Distinguished Professor
Animal Science
PhD, University of Alberta, 1989

**Majors**
- Bachelor of Science in Animal Science, Production/Industry Option (p. 125)
- Bachelor of Science in Animal Science, Science Option (p. 127)

**Minors**
- Animal Science Minor (p. 128)

**Certificates**
- Equine Science Certificate (p. 128)
- Meat Science Certificate (p. 128)

**Graduate**
- Master of Science in Animal Breeding
- Master of Agriculture in Animal Science
- Master of Science in Animal Science
- Master of Science in Physiology Reproduction
- Doctor of Philosophy in Animal Breeding
- Doctor of Philosophy in Animal Science
- Doctor of Philosophy in Physiology Reproduction

**Animal Science - BS, Production/Industry Option**

This curriculum prepares students for careers in animal-oriented agribusinesses. Other courses, in addition to animal science courses, include marketing, economics, genetics and management. A wide array of internships giving students invaluable experience in all phases of livestock production and related industries is available. Career opportunities include sales, management, public relations, marketing, quality control and education. Students may concentrate on an emphasis area within this option, including the following.

**Beef Cattle**

Students receive training that enables them to pursue careers in ranch management, feedlot management, pharmaceutical sales and other service-oriented livestock industries. Students are trained in all aspects of production, marketing and merchandising techniques for employment in the beef industry. The University Beef Cattle Center gives students hands-on experience.

**Dairy**

The focus of this emphasis area is to develop a well-rounded, knowledgeable student. Students have the opportunity to apply scientific principles, problem-solving methods, state-of-the-art techniques and information transfer to complex dairy production systems.

**Equine**

Designed for students with professional or vocational interests in horses and the horse industry. Coursework emphasizes equine nutrition, breeding, reproduction, health, management, training and judging. Lectures are reinforced with laboratories in which students work with horses. Graduates are well prepared for careers with horse production farms, stallion stations, performance and race training stables, breed associations, performance horse organizations, feed and pharmaceutical companies, county extension positions, and other industries and agencies related to the horse industry.

**Meat**

Students prepare for a career in the meats industry by taking meat science and processing and evaluation courses. Students also can conduct research through special problems courses and can gain valuable work experience on campus in the Meat Science Section or the Rosenthal Meat Science and Technology Center or off campus through internships or summer jobs. Job opportunities are available in packing, processing, retailing, purveying, food service, promotion, public relations and government regulatory agencies.
Sheep

Designed to prepare students for careers in the sheep and goat industries and in the associated wool and mohair industries, this emphasis gives students first-hand experience in sheep production and management practices, as well as procedures for processing and evaluating fleeces. Job opportunities are diverse and include flock management, marketing of lamb and fiber products, feed and pharmaceutical sales and county extension agent positions.

Swine

This emphasis area is designated for students planning to pursue a career in swine production or closely allied industries. Students are taught the principles of breeding and genetics, nutrition and feeding, animal health, environmental control and waste management as they relate to profitable swine production systems. These principles are reinforced by hands-on experience with the department’s swine herd. Career paths include management of swine production units and technical service or sales for feed, pharmaceutical and breeding stock companies.

Program Requirements

Animal Science Core Curriculum

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>AGLS 101</td>
<td>Modern Agricultural Systems and Renewable Resources</td>
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<tr>
<td>ANSC 108</td>
<td>General Animal Science</td>
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<tr>
<td>ANSC 303/</td>
<td>Principles of Animal Nutrition</td>
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<tr>
<td>NUTR 303</td>
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</tr>
<tr>
<td>ANSC 305</td>
<td>Animal Breeding</td>
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<tr>
<td>ANSC 307/</td>
<td>Meats</td>
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</tr>
<tr>
<td>FSTC 307</td>
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<tr>
<td>ANSC 318</td>
<td>Feeds and Feeding</td>
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<tr>
<td>ANSC 433</td>
<td>Reproduction in Farm Animals</td>
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<tr>
<td>ANSC 481</td>
<td>Seminar</td>
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Animal science production requirement

Select one of the following:

- ANSC 406 Beef Cattle Production and Management
- ANSC 412 Swine Production and Management
- ANSC 414 Sheep and Goat Production and Management
- ANSC 420 Equine Production and Management
- ANSC 447 Advanced Meat Science and Technology
- DASC 418 Feeding and Management of Dairy Cattle
- GENE 301 Comprehensive Genetics
- & GENE 312 Comprehensive Genetics Laboratory
- STAT 301 Introduction to Biometry

Production/Industry Option Curriculum

<table>
<thead>
<tr>
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<tr>
<td>ACCT 209</td>
<td>Survey of Accounting Principles</td>
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<tr>
<td>ANSC 437</td>
<td>Marketing and Grading of Livestock and Meats</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 222</td>
<td>Elements of Organic and Biological Chemistry</td>
<td>3</td>
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<tr>
<td>ENTO 201</td>
<td>General Entomology</td>
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<tr>
<td>or ENTO 208</td>
<td>or Veterinary Entomology</td>
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<tr>
<td>AGEC 330</td>
<td>Financial Management in Agriculture</td>
<td>3</td>
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<tr>
<td>or FINC 409</td>
<td>or Survey of Finance Principles</td>
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</table>
| Management elective

Select one of the following:

- AGEC 325 Principles of Farm and Ranch Management

University Core Curriculum

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<th>Course Title</th>
<th>Credit Hours</th>
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<tr>
<td>ANSC 107</td>
<td>General Animal Science</td>
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<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
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<td>or BIOL 107</td>
<td>or Zoology</td>
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<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
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<tr>
<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
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<tr>
<td>Communication (p. 20)</td>
<td></td>
<td>6</td>
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<tr>
<td>Government/Political science (p. 23)</td>
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<tr>
<td>POLS 206</td>
<td>American National Government</td>
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<td>POLS 207</td>
<td>State and Local Government</td>
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<tr>
<td>Social and behavioral sciences</td>
<td></td>
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</table>

Select one of the following:

- AGEC 105 Introduction to Agricultural Economics
- ECON 202 Principles of Economics
- ECON 203 Principles of Economics

American history (p. 23) | 6

Language, philosophy and culture (p. 21) | 3

Mathematics (p. 20) | 6

Creative arts (p. 22) | 3

Foreign language requirement (see Foreign Language table) | 3

International and cultural diversity (p. 34) | 3

Writing-intensive | 4

Total Semester Credit Hours | 120

1. Students are required to make a C or better for each of their courses in the major coursework area.
2. Credit by examination may be substituted for POLS 206 or POLS 207.
3. The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement. See academic advisor.
All undergraduate students must take at least (2) specific courses in their major designated as writing intensive (W). To be chosen in consultation with your academic advisor.

Foreign Language

Option 1
Completed two years high school foreign language

Option 2
Select one of the following:
- CLAS 101 Beginning Classical Greek I & CLAS 102 Beginning Classical Greek II
- CLAS 121 Beginning Latin I & CLAS 122 Beginning Latin II
- FREN 101 Beginning French I & FREN 102 Beginning French II
- GERM 101 Beginning German I & GERM 102 Beginning German II
- ITAL 101 Beginning Italian I & ITAL 102 Beginning Italian II
- JAPN 101 Beginning Japanese I & JAPN 102 Beginning Japanese II
- RUSS 101 Beginning Russian I & RUSS 102 Beginning Russian II
- SPAN 101 Beginning Spanish I & SPAN 102 Beginning Spanish II

Animal Science - BS, Science Option

This curriculum is designed to provide scientific expertise in chemistry, biological and physical sciences and mathematics and is recommended for students considering entry into the veterinary, medical or allied health field, or the graduate program of their choice. This option provides a strong background for graduate study in a wide variety of disciplines. Animal scientists graduating with a Bachelor of Science degree in this option who do not enter graduate or professional school find employment in rewarding careers in the pharmaceutical, clinical and food-related industries. Students may concentrate on an emphasis area within this option, including the following.

Pre-Professional

Students planning to pursue a career in veterinary medicine can complete all course requirements for admission to the professional curriculum in this emphasis. Students gain experience working with animals through direct contact in laboratory courses and directed field study. Students acquire knowledge of animal systems and animal behavior principles through coursework and interaction with livestock industry leaders. Students are also prepared to seek admission to the professional curricula in medicine, dentistry, pharmacy, optometry and physical therapy.

Pre-graduate Studies

This emphasis prepares students to pursue a Master of Science, Master of Agriculture or Doctor of Philosophy degree. Possible graduate programs include animal behavior, animal breeding, biochemistry, cellular and molecular biology, meats, dairy science, food science and technology, genetics, growth biology, nutrition and reproductive physiology. Experience gained through honors courses, internships, special problems courses and research laboratories helps the student identify specific disciplines of interest for graduate study. Students with advanced degrees are employed as university professors, research scientists or technicians, extension livestock specialists and technical representatives for industry.

Program Requirements

Animal Science Core Curriculum
- AGLS 101 Modern Agricultural Systems and Renewable Natural Resources
- ANSC 108 General Animal Science
- ANSC 303/ NUTR 303 Principles of Animal Nutrition
- ANSC 305 Animal Breeding
- ANSC 307/ FSTC 307 Meats
- ANSC 318 Feeds and Feeding
- ANSC 433 Reproduction in Farm Animals
- ANSC 481 Seminar

Animal science production requirement
Select one of the following:
- ANSC 406 Beef Cattle Production and Management
- ANSC 412 Swine Production and Management
- ANSC 414 Sheep and Goat Production and Management
- ANSC 420 Equine Production and Management
- ANSC 447 Advanced Meat Science and Technology
- DASC 418 Feeding and Management of Dairy Cattle

Science Option Curriculum
- BICH 410 Comprehensive Biochemistry I
- BICH 411 Comprehensive Biochemistry II
- BIOL 112 Introductory Biology II
- CHEM 102 Fundamentals of Chemistry II
- CHEM 112 Fundamentals of Chemistry Laboratory II
- CHEM 227 Organic Chemistry I
- CHEM 237 Organic Chemistry Laboratory
- CHEM 228 Organic Chemistry II
- CHEM 238 Organic Chemistry Laboratory
- PHYS 201 College Physics
- PHYS 202 College Physics
- Microbiology elective
  Select one of the following:
  - BIOL 206 Introductory Microbiology
  - BIOL 351 Fundamentals of Microbiology
  - VTPB 405 Biomedical Microbiology

Physiology elective
- VTPP 323 Physiology of Domestic Animals or BIOL 319 or Integrated Human Anatomy and Physiology I

General electives (electives may be chosen from the University Core Curriculum, if desired)
ANSC 107  General Animal Science 3
BIOL 111  Introductory Biology I 4
CHEM 101  Fundamentals of Chemistry I 4
& CHEM 111  and Fundamentals of Chemistry Laboratory I
ENGL 104  Composition and Rhetoric 3
ENGL 210  Technical and Business Writing 3
or COMM 203 or Public Speaking
Government/Political science electives (p. 23) 3
Social and Behavioral Science core course (p. 23) 4
American History elective (p. 23) 4
Language, Philosophy and Culture elective (p. 21) 4
Mathematics elective (p. 20) 6
Creative arts elective (p. 22) 4
Foreign language requirement (see Foreign Language table) 6
International and cultural diversity courses 5
Writing-intensive courses 6
Total Semester Credit Hours 120

1 Students are required to make a C or better for each of their courses in the major coursework area.
2 Students may choose to use general electives to complete a concentration in a pre-professional program, a pre-graduate study area, and/or a certificate program.
3 Credit by examination may be substituted for POLS 206 or POLS 207.
4 Certain courses in this University Core Curriculum category will fulfill credits toward the six-hour International and Cultural Diversity requirement.
5 Remaining international and cultural diversity (ICD) credits must be fulfilled if University Core Curriculum courses selected do not fulfill the six-hour ICD requirement.
6 All undergraduate students must take at least (2) specific courses in their major designated as writing intensive (W). To be chosen in consultation with your academic advisor.

Foreign Language

Option 1
Completed two years high school foreign language

Option 2
Select one of the following:
CLAS 101  Beginning Classical Greek I 8
& CLAS 102  and Beginning Classical Greek II
CLAS 121  Beginning Latin I 8
& CLAS 122  and Beginning Latin II
FREN 101  Beginning French I 8
& FREN 102  and Beginning French II
GERM 101  Beginning German I 8
& GERM 102  and Beginning German II
ITAL 101  Beginning Italian I 8
& ITAL 102  and Beginning Italian II
JAPN 101  Beginning Japanese I 8
& JAPN 102  and Beginning Japanese II
RUSS 101  Beginning Russian I 8
& RUSS 102  and Beginning Russian II

Spanish - Minor

Program Requirements
SPAN 101  Beginning Spanish I 8
& SPAN 102  and Beginning Spanish II

Animal Science - Minor

The Department of Animal Science offers a minor in Animal Science.

Program Requirements
ANSC 305  Animal Breeding 3
ANSC 307/FSTC 307  Meats 3
ANSC 320  Animal Nutrition and Feeding 3
ANSC 433  Reproduction in Farm Animals 3
Select one of the following:
ANSC 406  Beef Cattle Production and Management
ANSC 412  Swine Production and Management
ANSC 414  Sheep and Goat Production and Management
ANSC 420  Equine Production and Management
ANSC 447  Advanced Meat Science and Technology
Total Semester Credit Hours 16

ANC 107 and ANC 108 are required with a grade of "C" or better before minor is approved.

Equine Science - Certificate

The Department of Animal Science offers a certificate in Equine Science for students who wish to obtain specialization in this area.

Program Requirements
ANSC 201  Introductory Equine Care and Use 2
ANSC 311  Equine Behavior and Training 3
ANSC 411  Equine Nutrition and Health 3
ANSC 420  Equine Production and Management 4
ANSC 423  Issues in the Equine Industry 3
ANSC 494  Animal Science Internship 3
VLCS 422  Equine Disease and Epidemiology 3
Total Semester Credit Hours 21

Meat Science - Certificate

The Department of Animal Science offers a certificate in Meat Science for students who wish to obtain specialization in this area. The certificate is designed to provide a knowledge base to those individuals who have an interest in pursuing a career that involves the meat industry. Students must complete a minimum of 18 credit hours by taking four required courses and selecting additional courses from the elective list to complete the minimum credit hour requirement.

Program Requirements
ANSC 307/FSTC 307  Meats 3
DASC 326/FSTC 326  Food Bacteriology 3
ANSC 447  Advanced Meat Science and Technology routes
ANSC 457/  Hazard Analysis and Critical Control Point System  3
FSTC 457

Select 5 semester credit hours from the following:  5

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>ANSC 317</td>
<td>Meat Selection, Evaluation and Grading</td>
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<tr>
<td>ANSC 337</td>
<td>Meat Merchandising</td>
</tr>
<tr>
<td>ANSC 437</td>
<td>Marketing and Grading of Livestock and Meats</td>
</tr>
<tr>
<td>ANSC 485</td>
<td>Directed Studies</td>
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<tr>
<td>DASC 327</td>
<td>Food Bacteriology Lab</td>
</tr>
<tr>
<td>FSTC 327</td>
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</tr>
</tbody>
</table>

Total Semester Credit Hours  18

1 Students who have taken ANSC 489, Special Topics in Advanced Meat Technology, will be credited with ANSC 447.

2 Students who have taken ANSC 489, Special Topics in Meat Merchandising, will be credited with ANSC 337.

Department of Biochemistry/ Biophysics

Curriculum in Biochemistry is administered by the Department of Biochemistry and Biophysics.

Biochemists seek to understand life at the molecular level, including the detailed structures of biological molecules and the chemical reactions in which they participate. They study the molecules of living systems of all kinds, from the simplest viruses and bacteria to higher plants and animals. In their work, biochemists use experimental tools ranging from x-ray crystallography and nuclear magnetic resonance to bioinformatics and genetic engineering. Biochemistry is a dynamic and diverse field that has become the basic discipline for the life sciences, and biochemists have made significant discoveries that relate to medicine, agriculture, and the environment.

Faculty

Ayres, Nicola M, Senior Lecturer
Biochemistry And Biophysics
PhD, University of Nebraska, 1987

Bryk, Mary E, Associate Professor
Biochemistry And Biophysics
PhD, Albany Medical College, 1994

Cho, Jae H, Assistant Professor
Biochemistry And Biophysics
PhD, State University of New York at Stony Brook, 2006

Cruz-Reyes, Jorge A, Associate Professor
Biochemistry And Biophysics
PhD, London School of Hygiene & Tropical Medicine, 1992

Datta, Sumana, Professor
Biochemistry And Biophysics
PhD, University of California, San Diego, 1987

Deverene, Timothy P, Associate Professor
Biochemistry And Biophysics
PhD, University of Kentucky, 2000

Ellison, John R, Senior Lecturer
Biochemistry And Biophysics
PhD, University of Oregon, 1970

Glasner, Margaret E, Associate Professor
Biochemistry And Biophysics
PhD, Massachusetts Institute of Technology, 2003

Gohil, Vishal M, Assistant Professor
Biochemistry And Biophysics
PhD, Wayne State University, 2005

He, Ping, Associate Professor
Biochemistry And Biophysics
PhD, Kansas State University, 2003

Henderson, Michelle, Lecturer
Biochemistry And Biophysics
PhD, Texas A&M University, 2010

Herman, Jennifer K, Assistant Professor
Biochemistry And Biophysics
PhD, Indiana University, 2005

Hu, James C, Professor
Biochemistry And Biophysics
PhD, University of Wisconsin-Madison, 1987

Igumenova, Tatyana I, Associate Professor
Biochemistry And Biophysics
PhD, Columbia University, 2003

Kaplan, Craig D, Associate Professor
Biochemistry And Biophysics
PhD, Harvard University, 2003

Kunkel, Gary R, Associate Professor
Biochemistry And Biophysics
PhD, University of California, Los Angeles, 1977

Li, Pingwei, Associate Professor
Biochemistry And Biophysics
PhD, Peking University, 1996

Meek, Thomas D, Professor
Biochemistry And Biophysics
PhD, Pennsylvania State University, 1981

Miles, Bryant W, Senior Lecturer
Biochemistry And Biophysics
PhD, Texas A&M University, 1998

Mullet, John E, Professor
Biochemistry And Biophysics
PhD, University of Illinois at Urbana-Champaign, 1981

Mullins, Leisha H, Senior Lecturer
Biochemistry And Biophysics
PhD, Texas A&M University, 1989

Panin, Vladislav M, Professor
Biochemistry And Biophysics
PhD, Moscow State University, 1990
**Minors**

- Biochemistry Minor (p. 132)
- Genetics Minor (p. 133)

**Biochemistry - BS**

The undergraduate biochemistry curriculum is designed to provide a solid background in chemistry and the physical sciences, as well as in the biological sciences. Consequently, biochemistry is an especially versatile major giving undergraduates many options when they complete their BS degree. A biochemistry major provides a strong background for entering graduate school in a variety of fields, and the majority of biochemistry majors go on to graduate school or to professional schools such as medicine, veterinary medicine or dentistry. Biochemistry majors excel in biomedical professional schools because of their strong background in the basic sciences. In addition, a wide variety of job opportunities is open to biochemistry majors with a BS degree. Many find rewarding careers working in laboratories as research scientists, forensic scientists and technicians in clinical, governmental and university laboratories. Biochemists are also employed by diverse companies in the chemical, pharmaceutical, agricultural, food and scientific equipment industries.

Majors in Biochemistry must make a grade of C or better in CHEM 227, CHEM 237, CHEM 228 and CHEM 238 before registration in BICH 440. In addition, majors in Biochemistry must make a grade of C or better in all major coursework used to satisfy the degree plan.

**Program Requirements**

**First Year**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credit Hours</th>
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<tr>
<td>Fall</td>
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<tr>
<td>BICH 107</td>
<td>Horizons in Biological Chemistry</td>
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<td>CHEM 101</td>
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<td>CHEM 111</td>
<td>Fundamentals of Chemistry Laboratory I</td>
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<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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**Spring**

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<td>BIOL 112</td>
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<td>CHEM 102</td>
<td>Fundamentals of Chemistry II</td>
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<td>CHEM 112</td>
<td>Fundamentals of Chemistry Laboratory II</td>
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<td>ENGL 210</td>
<td>Technical and Business Writing</td>
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<tr>
<td>MATH 151</td>
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<tr>
<td>MATH 171</td>
<td>Analytic Geometry and Calculus</td>
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**Second Year**

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<td>CHEM 227</td>
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<td>CHEM 237</td>
<td>Organic Chemistry Laboratory</td>
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<td>--------------------------------</td>
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<td>MATH 172 Calculus</td>
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<td>PHYS 218 Mechanics</td>
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<td>CHEM 228 Organic Chemistry II</td>
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<td>CHEM 238 Organic Chemistry Laboratory</td>
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<td>Select one of the following:</td>
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<tr>
<td>MATH 251 Engineering Mathematics III</td>
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<td>MATH 221 Several Variable Calculus</td>
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<td>MATH 253 Engineering Mathematics III</td>
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<tr>
<td>PHYS 208 Electricity and Optics</td>
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<td>BICH 404 Biochemical Calculations</td>
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<td>BICH 440 Biochemistry I</td>
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<td>CHEM 327 Physical Chemistry I</td>
<td>Fall</td>
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<tr>
<td>GENE 302 Principles of Genetics</td>
<td>Fall</td>
<td>4</td>
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<tr>
<td>&amp; GENE 312 Comprehensive Genetics Laboratory</td>
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<tr>
<td>University Core Curriculum (p. 20)</td>
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<tr>
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<tr>
<td>BICH 414 Biochemical Techniques I</td>
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<td>BICH 432/GENE 432</td>
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<td>BICH 441 Biochemistry II</td>
<td>Spring</td>
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<td>BICH 491 Research</td>
<td>Spring</td>
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<td>CHEM 328 Physical Chemistry II</td>
<td>Spring</td>
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<tr>
<td>University Core Curriculum (p. 20)</td>
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<td>Free elective</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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<td><strong>Fourth Year</strong></td>
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<tr>
<td>Fall</td>
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<tr>
<td>BICH 431/GENE 431 Molecular Genetics</td>
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<tr>
<td>BICH 491 Research</td>
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<td>Select one of the following:</td>
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<tr>
<td>BOL 351 Fundamentals of Microbiology</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>BOL 413 Cell Biology</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>&amp; BOL 423 and Cell Biology Laboratory</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>Biochemistry elective (p. 653)</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>University Core Curriculum (p. 20)</td>
<td>Fall</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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<td><strong>15</strong></td>
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<tr>
<td>Spring</td>
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<tr>
<td>BICH 491 Research</td>
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<tr>
<td>Biochemistry elective (p. 653)</td>
<td>Spring</td>
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</tr>
</tbody>
</table>

**Total Semester Credit Hours:** 120

1. Often used for a minor degree. Students intending to pursue an advanced degree in biochemistry are strongly encouraged to use some free electives for additional upper division courses in BICH (p. 653), BIOL (p. 660), CHEM (p. 675), GENE (p. 793), MATH (p. 860), or STAT (p. 990).
2. To be selected from the University Core Curriculum (p. 19). Of the 21 hours shown as University Core Curriculum (p. 19) electives, 3 must be from language, philosophy and culture, 3 from creative arts, 3 from social and behavioral sciences, 6 from American history, 6 from POLS 206 and POLS 207. The Graduation requirements include a requirement for 6 hours of International and Cultural Diversity (p. 34) courses which may be met by courses satisfying the language, philosophy and culture, creative arts, social and behavioral sciences, government/political science and American history requirements if they are also on the approved list of international and cultural diversity courses.
3. Before registration in BICH 440, students must have attained a grade of C or better in each of these courses: CHEM 227, CHEM 228, CHEM 237, CHEM 238.
4. Hours to be selected from any 400-level course in BICH with approval of student’s academic advisor. BICH 414, BICH 432/GENE 432 or BICH 491 may not be used to satisfy this requirement.

Students must make a grade of C or better in all major coursework used to satisfy degree plan.

**Genetics - BS**

Curriculum in Genetics is administered by the Department of Biochemistry and Biophysics.

Genetics is one of the most exciting, rapidly expanding areas in the life sciences. More than an independent discipline, it has become the basis for understanding many aspects of medical and agricultural systems, animal and plant diseases, and even animal behavior. Developments in molecular genetics have provided biotechnologies that will dramatically affect our lives from the improved diagnosis of human disease, to the production of viral-resistant crops, to environmental cleanup.

The undergraduate curriculum in genetics allows the study of several different aspects of genetics, including population genetics, human genetics and genetic engineering. The genetics major is designed to develop the knowledge and skills necessary for advanced studies in all disciplines related to life sciences from medicine/veterinary medicine to genetic engineering. This basic science curriculum also has enough flexibility to allow a student to prepare for such diverse careers as forensics, medicine, business or law.

**Program Requirements**

**First Year**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credit Hours</th>
<th>Course</th>
</tr>
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<tbody>
<tr>
<td>Fall</td>
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<td>BIOL 111 Introductory Biology I</td>
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</table>

**University Core Curriculum (p. 20)** 6

**Free electives** 5

**Term Semester Credit Hours** 15

**Total Semester Credit Hours:** 120
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
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<td>CHEM 111</td>
<td>Fundamentals of Chemistry Laboratory I</td>
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<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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<td>GENE 105</td>
<td>Perspectives in Genetics: Past, Present and Future</td>
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**Term Semester Credit Hours** 14

**Spring**

<table>
<thead>
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<th>Course Code</th>
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<td>BIOL 112</td>
<td>Introductory Biology II</td>
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<td>CHEM 102</td>
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<td>CHEM 112</td>
<td>Fundamentals of Chemistry Laboratory II</td>
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<td>Engineering Mathematics I</td>
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<td>MATH 171</td>
<td>Analytic Geometry and Calculus</td>
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**Term Semester Credit Hours** 16

**Second Year**

**Fall**

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<tbody>
<tr>
<td>CHEM 227</td>
<td>Organic Chemistry I</td>
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<td>CHEM 237</td>
<td>Organic Chemistry Laboratory</td>
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<td>MATH 152</td>
<td>Engineering Mathematics II</td>
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<td>MATH 172</td>
<td>Calculus</td>
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<td>PHYS 201</td>
<td>College Physics</td>
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**Term Semester Credit Hours** 15

**Spring**

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CHEM 228</td>
<td>Organic Chemistry II</td>
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<td>CHEM 238</td>
<td>Organic Chemistry Laboratory</td>
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<tr>
<td>PHYS 202</td>
<td>College Physics</td>
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**Term Semester Credit Hours** 15

**Third Year**

**Fall**

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<th>Course Title</th>
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<tbody>
<tr>
<td>BICH 404</td>
<td>Biochemical Calculations</td>
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<tr>
<td>BICH 440</td>
<td>Biochemistry I</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>GENE 302</td>
<td>Principles of Genetics</td>
<td></td>
<td></td>
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<tr>
<td>&amp; GENE 312</td>
<td>and Comprehensive Genetics Laboratory</td>
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<td></td>
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<tr>
<td>STAT 302</td>
<td>Statistical Methods</td>
<td></td>
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<td></td>
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**Term Semester Credit Hours** 15

**Spring**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term</th>
<th>Semester</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>BICH 441</td>
<td>Biochemistry I</td>
<td></td>
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<tr>
<td>GENE 412</td>
<td>Population and Ecological Genetics</td>
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<tr>
<td>GENE 432/</td>
<td>Laboratory in Molecular Genetics</td>
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<td>BICH 432</td>
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<td>BICH 414</td>
<td>Biochemical Techniques I</td>
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<td>GENE 491</td>
<td>Research</td>
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**Term Semester Credit Hours** 15

**Fourth Year**

**Fall**

<table>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>BIOL 351</td>
<td>Fundamentals of Microbiology</td>
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<tr>
<td>BIOL 413</td>
<td>Cell Biology &amp; BIOL 423 and Cell Biology Laboratory</td>
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<td></td>
<td>3</td>
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<tr>
<td>GENE 431/BICH</td>
<td>Molecular Genetics</td>
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<td></td>
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</tr>
<tr>
<td>GENE 491</td>
<td>Research</td>
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<td></td>
<td>2</td>
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<tr>
<td></td>
<td>Genetics elective (p. 793)</td>
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<td></td>
<td>University Core Curriculum (p. 20)</td>
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**Term Semester Credit Hours** 15

**Spring**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term</th>
<th>Semester</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>GENE 491</td>
<td>Research</td>
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<tr>
<td></td>
<td>Genetics elective (p. 793)</td>
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<td>3</td>
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<td></td>
<td>University Core Curriculum (p. 20)</td>
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<td></td>
<td>Free electives</td>
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</table>

**Term Semester Credit Hours** 15

**Total Semester Credit Hours:** 120

1. Often used for a minor degree. Students intending to pursue an advanced degree in genetics are strongly encouraged to use some free electives for additional upper division courses in BICH (p. 653), BIOL (p. 660), CHEM (p. 675), GENE (p. 793), MATH (p. 860) or STAT (p. 990).

2. To be selected from the University Core Curriculum (p. 19). Of the 21 hours shown as University Core Curriculum (p. 19) electives, 3 must be from language, philosophy and culture, 3 from creative arts, 3 from social and behavioral sciences, 6 from American history, 6 from POLS 206 and POLS 207. The graduation requirements include a requirement for 6 hours of International and Cultural Diversity (p. 34) courses which may be met by courses satisfying the language, philosophy and culture, creative arts, social and behavioral sciences, government/political science and American history requirements if they are also on the approved list of international and cultural diversity courses.

3. Before registration in BICH 440, students must have attained a grade of C or better in each of these courses: CHEM 227, CHEM 228, CHEM 237, CHEM 238.

4. Hours to be selected from any 400-level course in GENE with approval of student’s academic advisor. GENE 432/BICH 432 or GENE 491 may not be used to satisfy this requirement.

Students must make a grade of C or better in all major coursework used to satisfy the degree plan.

**Biochemistry - Minor**

The Department of Biochemistry and Biophysics offers a minor in Biochemistry. Students seeking a minor must complete a minor form (http://biochemistry.tamu.edu/academics/undergraduate-programs/academic-requirements/minors) and have it approved and signed by the BICH/GENE undergraduate advisor and their major academic advisor.
Students are required to obtain a grade of ‘C’ or better in all minor courses and meet all minor course prerequisites.

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
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<th>Hours</th>
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<tbody>
<tr>
<td>BICH 410</td>
<td>Comprehensive Biochemistry I</td>
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<tr>
<td>or BICH 440</td>
<td>Biochemistry I</td>
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<tr>
<td>BICH 411</td>
<td>Comprehensive Biochemistry II</td>
<td>3</td>
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<tr>
<td>or BICH 441</td>
<td>Biochemistry II</td>
<td></td>
</tr>
<tr>
<td>BICH 414</td>
<td>Biochemical Techniques I</td>
<td>2</td>
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<tr>
<td>or BICH 432</td>
<td>Laboratory in Molecular Genetics</td>
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<tr>
<td>GENE 432</td>
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<td>BICH 431/</td>
<td>Molecular Genetics</td>
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<tr>
<td>GENE 431</td>
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<td>CHEM 327</td>
<td>Physical Chemistry I</td>
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<td>3</td>
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</table>

Total Semester Credit Hours 17

1 Hours to be selected from any 400-level course in BICH with approval of academic advisor.

Students must make a grade of "C" or better in all courses.

Genetics - Minor

The Department of Biochemistry and Biophysics offers a minor in Genetics. Students seeking a minor must complete a minor form (http://biochemistry.tamu.edu/academics/undergraduate-programs/academic-requirements/minors) and have it approved and signed by the BICH/GENE undergraduate advisor and their major academic advisor. Students are required to obtain a grade of ‘C’ or better in all minor courses and meet all minor course prerequisites.

Program Requirements

Select one of the following:

<table>
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<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>GENE 301</td>
<td>Comprehensive Genetics</td>
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<tr>
<td>GENE 302</td>
<td>Principles of Genetics</td>
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<td>GENE 320/</td>
<td>Biomedical Genetics</td>
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<td>BIMS 320</td>
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<td>GENE 412</td>
<td>Population and Ecological Genetics</td>
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Select two of the following:

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<td>GENE 404</td>
<td>Plant Breeding</td>
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<td>GENE 405/</td>
<td>Mammalian Genetics</td>
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<td>BIMS 405</td>
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<td>GENE 406/</td>
<td>Bacterial Genetics</td>
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<td>GENE 420</td>
<td>Bioethics</td>
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<td>GENE 421/</td>
<td>Advanced Human Genetics</td>
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<td>BIMS 421</td>
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<td>GENE 450</td>
<td>Recombinant DNA and Biotechnology</td>
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<td>GENE 452/</td>
<td>Modifying Mammalian Genomes for Biomedical</td>
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<td>BIMS 452</td>
<td>Research</td>
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Total Semester Credit Hours 15

Department of Biological and Agricultural Engineering

Biological and agricultural engineers apply their knowledge of physical and biological sciences, mathematics, engineering principles and engineering design to the production and processing of food and fiber, to the preservation of environmental quality, to biological systems and processes, and to machine systems that interface with all of these. Because of their broad general engineering background, biological and agricultural engineering graduates are sought by a wide variety of employers including environmental consulting firms, equipment manufacturers, crop storage and handling industries, the cotton and forest products industries, food and feed processing industries, animal production industries, biotechnology companies, electric utility companies, chemical companies, and governmental agencies. Biological and agricultural engineers make significant contributions to meeting many basic needs of society such as maintaining food quality, quantity and safety; improving environmental quality; and enhancing the quantity and quality of our water resources.

The Biological and Agricultural Engineering Department provides quality education, research and outreach in engineering and technology for the world’s agricultural, biological, environmental and food systems. Our undergraduate programs provide a high quality education for engineering and systems management students to fulfill the needs of industries we serve and advance our reputation as a world leader in engineering and systems management education.

Faculty

Capareda, Sergio C, Associate Professor
Biological & Agricultural Eng
PhD, Texas A&M University, 1990

Castell-Perez, M E, Professor
Biological & Agricultural Eng
PhD, Michigan State University, 1990

Faulkner, William B, Associate Professor
Biological & Agricultural Eng
PhD, Texas A&M University, 2008

Fernando, Sandun D, Associate Professor
Biological & Agricultural Eng
PhD, University of Nebraska, 2003

Gomes, Carmen L, Assistant Professor
Biological & Agricultural Eng
PhD, Texas A&M University, 2010

Huang, Yongheng, Associate Professor
Biological & Agricultural Eng
PhD, University of Nebraska, 2002

Karthikeyan, Raghupathy, Associate Professor
Biological & Agricultural Eng
PhD, Kansas State University, 2001

Kenimer, Ann L, Professor
Biological & Agricultural Eng
PhD, University of Illinois at Urbana-Champaign, 1990
Agricultural Systems Management - BS

Graduates of the Agricultural Systems Management program manage people, money and machines in the food and agricultural industries. They are typically employed as production or processing operations managers, equipment managers, or in technical sales and services. Employers include farm and industrial equipment companies, food processing plants, cotton gins, grain and seed companies, livestock feeding operations, irrigation companies, construction companies, manufacturers, and a variety of other employers who need technical managers.

The technological courses are applications-oriented and focus on practical experience in food processing systems, water management, machinery and power systems, electrical systems and electronics. Business courses include accounting, economics, marketing, management, law and finance. A student may obtain a minor in business by taking one course in addition to the AGSM requirements. Management and systems science techniques such as linear programming, simulation, optimization, queuing theory, inventory models, PERT/CPM and expert systems are taught along with applications for solving realistic problems faced by agribusiness managers. Supporting courses provide a foundation of mathematics, chemistry, computer and communications skills. Technical electives are available to develop a degree program that meets personal career objectives.

The curriculum is administered by the Department of Biological and Agricultural Engineering and leads to the Bachelor of Science degree in Agricultural Systems Management.

Program Requirements

First Year

<table>
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<tr>
<th>Fall</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>AGSM 201</td>
<td>Agricultural Energy and Power Systems</td>
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<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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<td>MATH 141</td>
<td>Business Mathematics I</td>
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<tr>
<td>Government/Political science elective (p. 23)</td>
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<tr>
<td>Creative arts elective (p. 22)</td>
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Spring

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<tbody>
<tr>
<td>AGSM 125</td>
<td>Introduction to Agricultural Systems Management</td>
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<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
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<td>CHEM 111</td>
<td>Fundamentals of Chemistry Laboratory I</td>
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<td>ENDG 105</td>
<td>Engineering Graphics</td>
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<td>Business Information Systems Concepts</td>
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<td>MATH 142</td>
<td>Business Mathematics II</td>
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Second Year

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<td>ACCT 209</td>
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<tr>
<td>AGSM 301</td>
<td>Systems Analysis in Agriculture</td>
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<td>COMM 203</td>
<td>Public Speaking</td>
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<td>ECON 202</td>
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<td>PHYS 201</td>
<td>College Physics</td>
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<tr>
<td>ACCT 210</td>
<td>Survey of Managerial and Cost Accounting Principles</td>
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<td>AGSM 360</td>
<td>Occupational Safety Management</td>
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<td>ENGL 210</td>
<td>Technical and Business Writing</td>
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<tr>
<td>ECON 203</td>
<td>Principles of Economics</td>
</tr>
<tr>
<td>Life and physical sciences elective (p. 20)</td>
<td></td>
</tr>
</tbody>
</table>

**Term Semester Credit Hours**: 16

**Spring**

- **Fall**
  - AGEC 330 or FINC 409: Financial Management in Agriculture or Survey of Finance Principles 2 3
  - AGSM 335: Water and Soil Management 3
  - AGSM 337: Technology for Environmental and Natural Resource Engineering 3
  - American history elective (p. 23) 1
  - Language, philosophy and culture elective (p. 21) 1

**Term Semester Credit Hours**: 15

**Fourth Year**

- **Fall**
  - AGEC 315: Food and Agricultural Sales (or Technical elective) 3
  - AGSM 403: Processing and Storage of Agricultural Products 3
  - AGSM 439: Management of Agricultural Systems I 4 3
  - AGSM 470: Agricultural Electronics and Control 3
  - MGMT 309 or AGEC 340: Survey of Management or Agribusiness Management 2 3
  - American history elective (p. 23) 1

**Term Semester Credit Hours**: 15

**Spring**

- AGSM 440: Management of Agricultural Systems II 4 3
- AGSM 473 or AGSM 475: Project Management for Agricultural Systems Technology or Applied Information Technologies for Agricultural Systems 3
- MKTG 409: Principles of Marketing or Marketing 3
- AGEC 314: Agricultural and Food Products 2

**Technical elective 1,3 6

**Term Semester Credit Hours**: 16

**Total Semester Credit Hours**: 125

1 The six hours of international and cultural diversity courses, as required for graduation, may be met in the curriculum. Students may select Language, Philosophy and Culture, Creative Arts, Technical Electives, or American History Electives that also meet the ICD requirement.

2 A minor in BUAD may be obtained by completing the noted courses. Each of these courses must be completed with a C or better.

3 Technical electives must be selected in consultation with the student’s advisor and from the current list of approved electives published by the department.

4 All undergraduate students must take at least two (2) specific courses in their major designated as writing intensive (W). This course is an approved W course.

A grade of C or better is required for all Common Body of Knowledge (CBK) courses: ACCT 209, AGSM 301, CHEM 101, CHEM 111, ECON 202, MATH 141, MATH 142 and PHYS 201, or equivalents.

### Biological and Agricultural Engineering - BS

The biological and agricultural engineering program develops graduates who can pursue engineering careers in industry, academia, consulting or government. The curriculum is designed:

- to produce graduates who are prepared to become practicing biological and agricultural engineers, many of whom will become registered professional engineers;
- to produce graduates to serve the engineering needs of clientele in environmental and natural resources, machine systems, food processing, bioprocessing, and agricultural production and processing; and
- to produce graduates who continue to be engaged in professional development.

Students learn to apply fundamental knowledge of biological and physical sciences, mathematics, and engineering principles to formulate and solve engineering problems. Engineering design is integrated throughout the curriculum, along with opportunities to develop communication, learning, and teamwork skills, culminating in a capstone design experience. Electives in the curriculum allow the student to specialize in one of the following areas:

- **Environmental and Natural Resources Engineering**—design and management of systems affecting soil, water, and air resources.
- **Renewable Energy Engineering**—design and development of biomass, wind and solar energy systems.
- **Food and Bioprocess Engineering**—design and development of systems for processing and handling of food and agricultural products and processes involving cells, enzymes, or other biological components.
- **Machine Systems Engineering**—design and development of machines and machine systems for food, feed and fiber production and processing.
Students select courses with the assistance of faculty advisors in an individualized advising system. Faculty members also assist with professional development and job placement for students.

The biological and agricultural engineering program is jointly administered by the College of Agriculture and Life Sciences and the Dwight Look College of Engineering, and the curriculum is fully accredited by the Engineering Accreditation Commission of ABET, Inc., www.abet.org. The department is one of the largest in North America and is consistently ranked as one of the top programs in the nation.

For graduates to become successful practicing biological and agricultural engineers, students need to acquire a set of skills, knowledge, and behaviors as they progress through the curriculum. We have established the following program outcomes outlining what students are expected to know and be able to do upon completion of the curriculum. At the time of graduation, students should have:

1. an ability to apply knowledge of mathematics, science and engineering;
2. an ability to design and conduct experiments, as well as to analyze and interpret data;
3. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
4. an ability to function on multidisciplinary teams;
5. an ability to identify, formulate, and solve engineering problems;
6. an understanding of professional and ethical responsibility;
7. an ability to communicate effectively;
8. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
9. a recognition of the need for, and an ability to engage in life-long learning;
10. a knowledge of contemporary issues;
11. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

### Program Requirements

#### First Year

<table>
<thead>
<tr>
<th>Semester Credit Hours</th>
<th>Course</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>CHEM 107</td>
<td>General Chemistry for Engineering Students</td>
</tr>
<tr>
<td>1</td>
<td>CHEM 117</td>
<td>General Chemistry for Engineering Students Laboratory</td>
</tr>
<tr>
<td>2</td>
<td>ENGR 111</td>
<td>Foundations of Engineering I</td>
</tr>
<tr>
<td>4</td>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
</tr>
<tr>
<td>4</td>
<td>PHYS 218</td>
<td>Mechanics</td>
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<th>Semester Credit Hours</th>
<th>Course</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>3</td>
<td>BIOL 113</td>
<td>Essentials in Biology</td>
</tr>
<tr>
<td>3</td>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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<tr>
<td>2</td>
<td>ENGR 112</td>
<td>Foundations of Engineering II</td>
</tr>
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<td>4</td>
<td>MATH 152</td>
<td>Engineering Mathematics II</td>
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#### Second Year

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<tr>
<td>3</td>
<td>CHEM 222</td>
<td>Elements of Organic and Biological Chemistry</td>
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<tr>
<td>3</td>
<td>MATH 251</td>
<td>Engineering Mathematics III</td>
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<td>MEEN 221</td>
<td>Statics and Particle Dynamics</td>
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<td>MEEN 222</td>
<td>Materials Science</td>
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<td>Government/Political science (p. 23)</td>
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<th>Course</th>
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<tr>
<td>3</td>
<td>BAEN 201</td>
<td>Analysis of Biological and Agricultural Engineering Problems</td>
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<tr>
<td>3</td>
<td>BAEN 301</td>
<td>Biological and Agricultural Engineering Fundamentals I</td>
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<tr>
<td>3</td>
<td>BAEN 320</td>
<td>Engineering Thermodynamics</td>
</tr>
<tr>
<td>3</td>
<td>CVEN 305</td>
<td>Mechanics of Materials</td>
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<tr>
<td>3</td>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
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<tr>
<td>3</td>
<td>MATH 308</td>
<td>Differential Equations</td>
</tr>
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#### Third Year

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<tr>
<td>3</td>
<td>BAEN 302</td>
<td>Biological and Agricultural Engineering Fundamentals II</td>
</tr>
<tr>
<td>3</td>
<td>BAEN 340</td>
<td>Fluid Mechanics</td>
</tr>
<tr>
<td>3</td>
<td>BAEN 354</td>
<td>Engineering Properties of Biological Materials</td>
</tr>
<tr>
<td>3</td>
<td>BAEN 375</td>
<td>Design Fundamentals for Agricultural Machines and Structures</td>
</tr>
<tr>
<td>3</td>
<td>ECEN 215</td>
<td>Principles of Electrical Engineering</td>
</tr>
<tr>
<td>15</td>
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<table>
<thead>
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<th>Course</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>3</td>
<td>BAEN 365</td>
<td>Unit Operations for Biological and Agricultural Engineering</td>
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<tr>
<td>3</td>
<td>BAEN 366</td>
<td>Transport Processes in Biological Systems</td>
</tr>
<tr>
<td>3</td>
<td>BAEN 370</td>
<td>Measurement and Control of Biological Systems and Agricultural Processes</td>
</tr>
<tr>
<td>3</td>
<td>American history (p. 23)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Government/Political science (p. 23)</td>
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<tr>
<td>3</td>
<td>Mathematics (p. 860)</td>
<td></td>
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#### Fourth Year

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<thead>
<tr>
<th>Semester Credit Hours</th>
<th>Course</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>3</td>
<td>BAEN 479</td>
<td>Biological and Agricultural Engineering Design I</td>
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<tr>
<td>3</td>
<td>ENGR 482/PHIL 482</td>
<td>Ethics and Engineering</td>
</tr>
<tr>
<td>3</td>
<td>BAEN elective (p. 647)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>ENGR elective (p. 761)</td>
<td></td>
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<tr>
<td>3</td>
<td>Social and behavioral sciences (p. 23)</td>
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<td>15</td>
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</table>
Spring
BAEN 480 Biological and Agricultural Engineering Design II 4 3
BAEN elective (p. 647) 3
American history (p. 23) 2
Creative arts (p. 22) 2
Technical elective 3

<table>
<thead>
<tr>
<th>Term Semester Credit Hours</th>
<th>15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Semester Credit Hours:</td>
<td>127</td>
</tr>
</tbody>
</table>

1. Entering students will normally be given a placement test in mathematics. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.
2. The six hours of international and cultural diversity courses, as required for graduation, may be met by courses that also satisfy a core curriculum course.
3. Engineering, mathematics and technical electives must be selected from a departmental approved list in consultation with an academic advisor.
4. All undergraduate students must take at least two (2) specific courses in their major designated as writing intensive.

A grade of C or better is required for all math, science, and engineering courses.

Agricultural Systems Management - Minor

The minor in Agricultural Systems Management is available to all students enrolled at Texas A&M University. The primary educational objective of this minor program is to provide students, majoring in other fields, with a fundamental knowledge of the fields of agricultural systems management.

Program Requirements

Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGSM 201</td>
<td>Agricultural Energy and Power Systems</td>
<td>3</td>
</tr>
<tr>
<td>AGSM 301</td>
<td>Systems Analysis in Agriculture</td>
<td>3</td>
</tr>
<tr>
<td>AGSM 325</td>
<td>Agri-Industrial Applications of Electricity</td>
<td>3</td>
</tr>
<tr>
<td>AGSM 335</td>
<td>Water and Soil Management</td>
<td>3</td>
</tr>
<tr>
<td>AGSM 360</td>
<td>Occupational Safety Management</td>
<td>3</td>
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</table>

Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGSM 337</td>
<td>Technology for Environmental and Natural Resource Engineering</td>
<td>3</td>
</tr>
<tr>
<td>or AGSM 470</td>
<td>or Agricultural Electronics and Control</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours | 18 |

Students must make a grade of "C" or better in all courses.

Department of Ecosystem Science and Management

The Department of Ecosystem Science and Management provides one of the most advanced educational opportunities available to prepare undergraduate students for leadership in the science and stewardship of rangeland, forest and wetland ecosystems across the rural-urban gradient. We offer Bachelors of Science degrees in Ecological Restoration, Forestry, Rangeland Ecology and Management, Renewable Natural Resources, and Spatial Sciences.

Faculty

Boutton, Thomas W, Professor
Ecosystem Science & Mgmt
PhD, Brigham Young University, 1979

Briske, David D, Professor
Ecosystem Science & Mgmt
PhD, Colorado State University, 1978

Casola, Claudio, Assistant Professor
Ecosystem Science & Mgmt
PhD, University of Pisa, Italy, 2006

Crider, Diana L, Visiting Assistant Professor
Ecosystem Science & Mgmt
PhD, Texas A&M University-Kingsville, 2003

Eriksson, Marian, Associate Professor
Ecosystem Science & Mgmt
PhD, University of Minnesota, 1989

Feagin, Russell A, Associate Professor
Ecosystem Science & Mgmt
PhD, Texas A&M University, 2003

Fleischman, Forrest D, Assistant Professor
Ecosystem Science & Mgmt
PhD, Indiana University, 2012

Gan, Jianbang, Professor
Ecosystem Science & Mgmt
PhD, Iowa State University, 1990

Hamilton, Wayne T, Senior Lecturer
Ecosystem Science & Mgmt
MS, Sul Ross State University, 1976

Hatch, Stephan L, Professor
Ecosystem Science & Mgmt
PhD, Texas A&M University, 1975

Kavanagh, Kathleen L, Professor
Ecosystem Science & Mgmt
PhD, Oregon State University, 1993

Knight, Robert W, Associate Professor
Ecosystem Science & Mgmt
PhD, Texas A&M University, 1980

Kothmann, Merwyn M, Professor
Ecosystem Science & Mgmt
PhD, Texas A&M University, 1968

Kreuter, Urs P, Professor
Ecosystem Science & Mgmt
PhD, Utah State University, 1992

Lawing, Anna M, Assistant Professor
Ecosystem Science & Mgmt
PhD, Indiana University, 2012

Feagin, Russell A, Associate Professor
Ecosystem Science & Mgmt
PhD, Texas A&M University, 2003

Fleischman, Forrest D, Assistant Professor
Ecosystem Science & Mgmt
PhD, Indiana University, 2012
Loopstra, Carol A, Associate Professor  
Ecosystem Science & Mgmt  
PhD, North Carolina State University, 1992  

Moore, Georgianne W, Associate Professor  
Ecosystem Science & Mgmt  
PhD, Oregon State University, 2004  

Popescu, Sorin C, Professor  
Ecosystem Science & Mgmt  
PhD, Virginia Tech, 2002  

Rogers, William E, Professor  
Ecosystem Science & Mgmt  
PhD, Kansas State University, 1998  

Shaw, Robert B, Professor  
Ecosystem Science & Mgmt  
PhD, Texas A&M University, 1979  

Smeins, Fred E, Visiting Professor  
Ecosystem Science & Mgmt  
PhD, University of Saskatchewan, 1967  

Srinivasan, Raghavan, Professor  
Ecosystem Science & Mgmt  
PhD, Purdue University, 1992  

Vogel, Jason G, Associate Professor  
Ecosystem Science & Mgmt  
PhD, University of Alaska Fairbanks, 2004  

Watson, Wesley T, Lecturer  
Ecosystem Science & Mgmt  
PhD, Texas A&M University, 1999  

West, Jason B, Associate Professor  
Ecosystem Science & Mgmt  
PhD, University of Georgia, 2002  

Whisenant, Steven G, Professor  
Ecosystem Science & Mgmt  
PhD, Texas A&M University, 1982  

Wilcox, Bradford P, Professor  
Ecosystem Science & Mgmt  
PhD, Texas A&M University, 1986  

Wu, Xinyuan B, Professor  
Ecosystem Science & Mgmt  
PhD, University of Tennessee, 1991  

Majors  

- Bachelor of Science in Ecological Restoration (p. 138)  
- Bachelor of Science in Forestry (p. 139)  
- Bachelor of Science in Rangeland Ecology and Management, Ranch Management Option (p. 140)  
- Bachelor of Science in Rangeland Ecology and Management, Rangeland Resources Option (p. 141)  
- Bachelor of Science in Renewable Natural Resources (p. 142)  
- Bachelor of Science in Spatial Sciences (p. 144)  

Minors  

- Forest Science Minor (p. 144)  
- Rangeland Ecology and Management Minor (p. 145)  
- Spatial Sciences Minor (p. 145)  

Certificates  

- Watershed Certificate (p. 145)  

Ecological Restoration - BS  

Ecological restoration is the process of repairing dysfunctional ecosystems to provide essential ecosystem goods and services important to society. The Ecological Restoration degree prepares students for a career that requires an understanding of the causes of land degradation and strategies for recovery of ecosystems damaged, degraded, or destroyed by natural or human causes.

The curriculum focuses on restoration of damaged ecosystems and landscapes, particularly terrestrial, wetland, and riparian systems in diverse settings that span the rural-urban spectrum. The discipline of ecological restoration requires a strong conceptual/theoretical foundation as well as a practical application component. This degree combines basic sciences, modern technologies, and contemporary ecological knowledge. Students will develop practical capabilities and gain critical understanding of the interaction of biophysical, socio-economic and political drivers that affect land degradation and restoration through a program that incorporates integrated coursework and an internship with ecological restoration practitioners.

Completion of this degree will prepare students to assess the causes of ecosystem degradation and to develop strategies for ecological restoration at multiple spatial scales. Graduates will be equipped for professional careers with environmental consulting companies, governmental and non-governmental land management organizations, and regulatory agencies. This degree program also provides a foundation for students planning to pursue advanced degrees in restoration ecology, disturbed land reclamation, natural resources conservation and management, or related fields. The total number of credit hours required for graduation is 120 hours.

Program Requirements  

**Ecosystem Science and Management Core Courses**  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEC 350</td>
<td>Environmental and Natural Resource Economics</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 201</td>
<td>Exploring Ecosystem Science and Management</td>
<td>1</td>
</tr>
<tr>
<td>ESSM 301</td>
<td>Wildland Watershed Management</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 302</td>
<td>Wildland Plants of North America</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 306</td>
<td>Plant Functional Ecology and Adaptation</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 311</td>
<td>Biogeochemistry and Global Change</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 313</td>
<td>Vegetation Sampling Methods and Designs in Ecosystems</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 318</td>
<td>Coupled Social and Ecological Systems</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 320</td>
<td>Ecosystem Restoration and Management</td>
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<tr>
<td>ESSM 351</td>
<td>Geographic Information Systems for Resource Management</td>
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</tr>
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<td>ESSM 406</td>
<td>Natural Resources Policy</td>
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<tr>
<td>or RENR 470</td>
<td>or Environmental Impact Assessment</td>
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<tr>
<td>ESSM 481</td>
<td>Senior Seminar</td>
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</tr>
<tr>
<td>RENR 205</td>
<td>Fundamentals of Ecology</td>
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</tr>
<tr>
<td>SCSC 301</td>
<td>Soil Science</td>
<td>4</td>
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</tbody>
</table>
The Department of Ecosystem Science and Management provides one of the most advanced educational opportunities available for developing leaders in the management, conservation and restoration of the world’s diverse forests. Students seeking to study forestry in this department are interested in solving problems related to protecting forest biodiversity, providing wood, water, recreation and wildlife for a growing society, and contributing to the advancement of knowledge about forests. Resolving today’s forest management issues requires a broad education in the biological, physical and social sciences, a solid understanding of the methods used to integrate information from many fields and to solve problems, and an in-depth knowledge of the sophisticated tools and techniques that are an essential part of modern forestry. Curriculum in the Department of Ecosystem Science and Management incorporates these ideas so that motivated and capable students can become competent forest and resource management professionals and scientists.

Forests cover one-third of the land area of the United States. The products and services derived from forests, and the scenic beauty they provide, have contributed to the well-being of the American people since the founding of this country. These benefits range from lumber and paper to recreation and biological diversity. Forests also are renewable. Under proper stewardship, they yield products and biodiversity indefinitely. Proper management of forests, which is the responsibility of the professional forester, results in healthy, productive forests that are capable of serving human needs and providing a quality environment in rural or urban settings.

The primary objective of the Department of Ecosystem Science and Management is to educate students in the scientific management of forest resources. Students select a course of study best suited to their educational and career goals. Students also receive help from faculty advisors in their areas of interest. The total number of credit hours required for a degree is 120.

### Program Requirements

#### Ecological Restoration Core Courses

Select one of the following: 3-4

- ESSM 203 Forest Trees of North America
- ESSM 303 Agrostology
- ESSM 304 Rangeland Plant Taxonomy
- ESSM 416 Fire Ecology and Natural Resource Management
- ESSM 420 Ecological Restoration of Wetland and Riparian Systems
- ESSM 430 Advanced Restoration Ecology

Directed electives 1 18

Free electives 8-9

#### University Core Curriculum

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tr>
<td>AGEC 105</td>
<td>Introduction to Agricultural Economics</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 101</td>
<td>Botany</td>
<td>4</td>
</tr>
<tr>
<td>or BIOL 113</td>
<td>or Essentials in Biology</td>
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<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
<td>4</td>
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<tr>
<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
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<tr>
<td>RENR 215</td>
<td>Fundamentals of Ecology–Laboratory</td>
<td>1</td>
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<tr>
<td>American history electives (p. 23) 2</td>
<td>6</td>
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<tr>
<td>Communication electives (p. 20) 2</td>
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<tr>
<td>Creative arts elective (p. 22) 2</td>
<td>3</td>
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<tr>
<td>Government/Political science electives (p. 23) 3</td>
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<tr>
<td>Language, philosophy and culture elective (p. 21) 2</td>
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<td>Mathematics electives (MATH prefix required) (p. 20) 2</td>
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#### Total Semester Credit Hours 120

1. To be selected in consultation with an advisor.
2. The Graduation requirements include a requirement for six hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement. See academic advisor.
3. Credit by examination may be used to substitute three hours of POLS 206 or POLS 207.

Forestry - BS

The Department of Ecosystem Science and Management provides one of the most advanced educational opportunities available for developing leaders in the management, conservation and restoration of the world’s diverse forests. Students seeking to study forestry in this department are interested in solving problems related to protecting forest biodiversity, providing wood, water, recreation and wildlife for a growing society, and contributing to the advancement of knowledge about forests. Resolving today’s forest management issues requires a broad education in the biological, physical and social sciences, a solid understanding of the methods used to integrate information from many fields and to solve problems, and an in-depth knowledge of the sophisticated tools and techniques that are an essential part of modern forestry. Curriculum in the Department of Ecosystem Science and Management incorporates these ideas so that motivated and capable students can become competent forest and resource management professionals and scientists.

Forests cover one-third of the land area of the United States. The products and services derived from forests, and the scenic beauty they provide, have contributed to the well-being of the American people since the founding of this country. These benefits range from lumber and paper to recreation and biological diversity. Forests also are renewable. Under proper stewardship, they yield products and biodiversity indefinitely. Proper management of forests, which is the responsibility of the professional forester, results in healthy, productive forests that are capable of serving human needs and providing a quality environment in rural or urban settings.

The primary objective of the Department of Ecosystem Science and Management is to educate students in the scientific management of forest resources. Students select a course of study best suited to their educational and career goals. Students also receive help from faculty advisors in their areas of interest. The total number of credit hours required for a degree is 120.

### Program Requirements

#### Ecosystem Science and Management Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>AGEC 350</td>
<td>Environmental and Natural Resource Economics</td>
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<td>Exploring Ecosystem Science and Management</td>
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<td>ESSM 301</td>
<td>Wildland Watershed Management</td>
<td>3</td>
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<td>ESSM 302</td>
<td>Wildland Plants of North America</td>
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<tr>
<td>ESSM 306</td>
<td>Plant Functional Ecology and Adaptation</td>
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<td>ESSM 311</td>
<td>Biogeochemistry and Global Change</td>
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<td>ESSM 313</td>
<td>Vegetation Sampling Methods and Designs in Ecosystems</td>
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<td>ESSM 318</td>
<td>Coupled Social and Ecological Systems</td>
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<tr>
<td>ESSM 320</td>
<td>Ecosystem Restoration and Management</td>
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<tr>
<td>ESSM 351</td>
<td>Geographic Information Systems for Resource Management</td>
<td>3</td>
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<td>ESSM 406</td>
<td>Natural Resources Policy</td>
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<tr>
<td>or RENR 470</td>
<td>or Environmental Impact Assessment</td>
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<tr>
<td>ESSM 481</td>
<td>Senior Seminar</td>
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<tr>
<td>RENR 205</td>
<td>Fundamentals of Ecology</td>
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#### Forest Core Courses

<table>
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<tbody>
<tr>
<td>ESSM 203</td>
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<td>ESSM 300</td>
<td>Field Studies in Forest Ecosystems</td>
<td>3</td>
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<td>ESSM 307</td>
<td>Forest Protection</td>
<td>3</td>
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<td>ESSM 309</td>
<td>Forest Ecology</td>
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<td>ESSM 319</td>
<td>Principles of Forestry</td>
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<td>ESSM 405</td>
<td>Forest Resource Assessment and Management (W)</td>
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Directed electives 1 9

Free electives 11

#### University Core Curriculum

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<td>BIOL 101</td>
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<td>or BIOL 113</td>
<td>or Essentials in Biology</td>
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<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
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<td>&amp; CHEM 111</td>
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<tr>
<td>American history elective (p. 23) 2</td>
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<td>Communication elective (p. 20) 2</td>
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<td>Creative arts elective (p. 22) 2</td>
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<td>Government/Political science elective (p. 23) 2,3</td>
<td>6</td>
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</tbody>
</table>
Language, philosophy and culture elective (p. 21)  
Mathematics elective (MATH prefix required) (p. 20)  

Total Semester Credit Hours  

1 To be selected in consultation with an advisor.
2 The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement. See academic advisor.
3 Credit by examination may be used to substitute for 3 hours of POLS 206 or POLS 207.

Rangeland Ecology and Management - BS, Ranch Management Option

Students majoring in Rangeland Ecology and Management are taught to integrate knowledge and technology in a systems approach to manage land for sustainable utilization of natural resources. Emphasis is placed on conservation and maintenance of biological diversity in wet to arid environments and sustainable production, conservation and function of land. Rangelands comprise approximately 50% of the land area of the United States and the world. Natural resources on rangelands provide many products and values for society including: livestock grazing, habitat for game and non-game wildlife, water for urban and agricultural uses, recreational opportunities, minerals, oil and gas. The expansiveness and diversity of rangelands require that knowledge and technology be drawn from numerous disciplines.

Employment opportunities are diverse. They include all aspects of natural resource management, including ranch management, environmental consulting, conservation and natural resource planning on private lands and with state and federal agencies. Students also find employment in agribusiness sales, marketing, agricultural finance real estate, consulting and reclamation. Students can also pursue professional careers in teaching agricultural science.

Two options in the Rangeland Ecology and Management curriculum provide the opportunity for specialization in a minor field.

Ranch Management Option

Designed for students preparing for careers in ranch management and agribusiness. This option emphasizes management and utilization of rangeland for livestock and wildlife production. It provides excellent preparation for students desiring to obtain a Master of Agriculture degree in ranch management. Employment opportunities are available on private ranches, businesses, and industries supporting ranches and with state and federal agencies.

Emphasis Areas

Ecology

Designed for students to explore and specialize in a diverse array of ecological topics. They study plants and animals and the ecological principles essential for effective conservation, management and restoration of the land and associated natural resources. They are prepared for careers in resource monitoring, management and conservation with state and federal agencies and the private sector.

Environmental Science

Designed for students preparing for professional careers in environmental management. The coursework includes a basic foundation of ecological sciences, plant taxonomy and rangeland management with emphasis on plants, water and soils. Job opportunities are available in environmental consulting firms, public utility companies, municipalities and federal environmental agencies. The curriculum provides a good foundation for students planning to pursue graduate studies in watershed management, environmental sciences, pollution control or waste management.

Preventive Medicine

Prepares students for admission to the professional program in veterinary medicine. Students planning to work in large animal practice would benefit from studies in rangeland ecology and management.

Range/Soil Conservation

Designed to qualify students as range management specialists or soil conservationists with the federal government. The curriculum will provide students with competitive ratings with federal Civil Service for positions with the Natural Resources Conservation Service, Forest Service and Bureau of Land Management. Various electives and work experience may be used to increase the rating score. Job opportunities are also available in private and state organizations.

Teaching

For students majoring in rangeland ecology and management who wish to teach. Directed electives may be chosen so that, following this curriculum, the student is eligible to enter the induction year as a teacher of agricultural science under the Texas Education Agency Plan. Off-campus student teaching is required.

Watershed Resources

For students preparing for a professional career in watershed management. Graduates qualify for employment as range management specialists and soil conservationists or, with proper selection of electives, as hydrologists. Opportunities are also available in environmental consulting firms, public utility companies, land reclamation firms, municipalities, secondary school education and private land management.

Program Requirements

Ecosystem Science and Management Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>AGEC 350</td>
<td>Environmental and Natural Resource Economics 1</td>
<td>3</td>
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<td>or AGEC 325</td>
<td>Principles of Farm and Ranch Management</td>
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<tr>
<td>ESSM 201</td>
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<td>ESSM 320</td>
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<td>ESSM 406</td>
<td>Natural Resources Policy</td>
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<tr>
<td>or RENR 470</td>
<td>or Environmental Impact Assessment</td>
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<tr>
<td>ESSM 481</td>
<td>Senior Seminar</td>
<td>1</td>
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</tbody>
</table>
Rangeland Ecology and Management Core Courses

- RENR 205 Fundamentals of Ecology  
- SCSC 301 Soil Science

Rangeland Ecology and Management Core Courses

- ESSM 314 Principles of Rangeland Management Around the World  
- ESSM 315 Rangeland Inventory and Monitoring  
- ESSM 316 Range Ecology  
- ESSM 317 Vegetation Management  
- ESSM 415 Range Analysis and Management Planning^2  
  or RENR 410 or Ecosystem Management

Ranch Management Option

- ANSC 107 General Animal Science  
- ANSC 108 General Animal Science  
- ANSC 302 Basic Beef Cattle Production  
- ANSC 320 Animal Nutrition and Feeding  
- Directed electives^2  
- Electives

University Core Curriculum

- AGEC 105 Introduction to Agricultural Economics  
- BIOL 101 Botany  
- CHEM 101 Fundamentals of Chemistry I  
- CHEM 111 Fundamentals of Chemistry Laboratory I  
- RENR 215 Fundamentals of Ecology--Laboratory  
- American history electives (p. 23)^3  
- Communication electives (p. 20)^3  
- Creative arts elective (p. 22)^3  
- Government/Political science electives (p. 23)^3,4  
- Language, philosophy and culture elective (p. 21)^3  
- Mathematics electives (MATH prefix required) (p. 20)

Total Semester Credit Hours 120

1 Students must take this course for the Ranch Management Option.
2 To be selected in consultation with an advisor.
3 The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement. See academic advisor.
4 Credit by examination may be used to substitute for 3 hours of POLS 206 or POLS 207.

Rangeland Ecology and Management - BS, Rangeland Resources Option

Students majoring in Rangeland Ecology and Management are taught to integrate knowledge and technology in a systems approach to manage land for sustainable utilization of natural resources. Emphasis is placed on conservation and maintenance of biological diversity in wet to arid environments and sustainable production, conservation and function of land. Rangelands comprise approximately 50% of the land area of the United States and the world. Natural resources on rangelands provide many products and values for society including: livestock grazing, habitat for game and non-game wildlife, water for urban and agricultural uses, recreational opportunities, minerals, oil and gas. The expansiveness and diversity of rangelands require that knowledge and technology be drawn from numerous disciplines.

Employment opportunities are diverse. They include all aspects of natural resource management, including ranch management, environmental consulting, conservation and natural resource planning on private lands and with state and federal agencies. Students also find employment in agribusiness sales, marketing, agricultural finance real estate, consulting and reclamation. Students can also pursue professional careers in teaching agricultural science.

Two options in the Rangeland Ecology and Management curriculum provide the opportunity for specialization in a minor field.

Rangeland Resources Option

Designed for students preparing for careers in the private, state and federal sectors in the area of natural resources conservation and management. It also provides good preparation for graduate study leading to positions in extension, teaching, research and consulting. It allows maximum flexibility to orient a degree program towards specific career interests. Students are encouraged to develop an emphasis area by selecting 15 hours of directed elective courses in related disciplines. Several suggested emphasis areas for the Rangeland Resources Option follow.

Emphasis Areas

Ecology

Designed for students to explore and specialize in a diverse array of ecological topics. They study plants and animals and the ecological principles essential for effective conservation, management and restoration of the land and associated natural resources. They are prepared for careers in resource monitoring, management and conservation with state and federal agencies and the private sector.

Environmental Science

Designed for students preparing for professional careers in environmental management. The coursework includes a basic foundation of ecological sciences, plant taxonomy and rangeland management with emphasis on plants, water and soils. Job opportunities are available in environmental consulting firms, public utility companies, municipalities and federal environmental agencies. The curriculum provides a good foundation for students planning to pursue graduate studies in watershed management, environmental sciences, pollution control or waste management.

Preveterinary Medicine

Prepares students for admission to the professional program in veterinary medicine. Students planning to work in large animal practice would benefit from studies in rangeland ecology and management.

Range/Soil Conservation

Designed to qualify students as range management specialists or soil conservationists with the federal government. The curriculum will provide students with competitive ratings with federal Civil Service for positions with the Natural Resources Conservation Service, Forest Service and Bureau of Land Management. Various electives and work experience may be used to increase the rating score. Job opportunities are also available in private and state organizations.
Teaching
For students majoring in rangeland ecology and management who wish to teach. Directed electives may be chosen so that, following this curriculum, the student is eligible to enter the induction year as a teacher of agricultural science under the Texas Education Agency Plan. Off-campus student teaching is required.

Watershed Resources
For students preparing for a professional career in watershed management. Graduates qualify for employment as range management specialists and soil conservationists or, with proper selection of electives, as hydrologists. Opportunities are also available in environmental consulting firms, public utility companies, land reclamation firms, municipalities, secondary school education and private land management.

Program Requirements

Ecosystem Science and Management Core Courses

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<td>ESSM 301</td>
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<td>ESSM 302</td>
<td>Wildland Plants of North America</td>
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<td>ESSM 306</td>
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<td>ESSM 318</td>
<td>Coupled Social and Ecological Systems</td>
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<td>ESSM 320</td>
<td>Ecosystem Restoration and Management</td>
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<td>ESSM 351</td>
<td>Geographic Information Systems for Resource Management</td>
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<td>ESSM 406</td>
<td>Natural Resources Policy</td>
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<td>or RENR 470</td>
<td>Environmental Impact Assessment</td>
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<td>ESSM 481</td>
<td>Senior Seminar</td>
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<td>Fundamentals of Ecology</td>
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<td>SCSC 301</td>
<td>Soil Science</td>
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Rangeland Ecology and Management Core Courses

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<th>Course Title</th>
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<td>ESSM 315</td>
<td>Rangeland Inventory and Monitoring</td>
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<td>ESSM 316</td>
<td>Range Ecology</td>
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<td>ESSM 317</td>
<td>Vegetation Management</td>
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<td>ESSM 415</td>
<td>Range Analysis and Management Planning</td>
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<td>Ecosystem Management</td>
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Rangeland Resources Option

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<td>Rangeland Plant Taxonomy</td>
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<tr>
<td>SCSC 310</td>
<td>Soil Morphology and Interpretations</td>
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Directed electives 2

Electives 15

University Core Curriculum

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<th>Course Title</th>
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<td>or BIOL 113</td>
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<td>CHEM 101</td>
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RENR 215 Fundamentals of Ecology--Laboratory 1

American history electives (p. 23) 3 6
Communication electives (p. 20) 3 6
Creative arts elective (p. 22) 3 3
Government/Political science electives (p. 23) 3,4 6
Language, philosophy and culture elective (p. 21) 3 3
Mathematics electives (MATH prefix required) (p. 20) 6

Total Semester Credit Hours 120

1 Students must take this course for the Range/Soil Conservation Emphasis in the Rangeland Resources Option.
2 To be selected in consultation with an advisor.
3 The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement. See academic advisor.
4 Credit by examination may be used to substitute for 3 hours of POLS 206 or POLS 207.

Renewable Natural Resources - BS

Professional Fields of Study and Department Heads

Ecosystem Science and Management, Kathleen Kavanagh, Head
Recruitment, Park and Tourism Sciences, Gary D. Ellis, Head
Wildlife and Fisheries Sciences, John B. Carey, Interim Head

General Statement

Three departments offer degrees in specific areas of natural resources management and conservation. Students may select one of these degree programs or a broad approach to natural resource education by pursuing the multi-department degree in Renewable Natural Resources.

Renewable Natural Resources

Renewable Natural Resources (RENR) is for students desiring a rigorous education in the study and management of sustainable ecosystems for a wide variety of resource values. The RENR program of study is comprised of a core of courses and two emphases. The goal of this core/emphasis structure is to provide students with an identity as a renewable natural resources specialist, while, at the same time, affording the flexibility for preparation for a variety of career tracks. One emphasis focuses on management and the other on policy. Technical electives prepare the students in chosen educational and career directions. The underlying goal of the RENR degree is to integrate the scientific issues of renewable natural resources. Graduates of this program will be able to articulate these issues verbally and in writing in their chosen career. Therefore, the RENR degree emphasizes verbal presentations and major papers as well as field-oriented activities.

The RENR programs are designed to help students prepare for careers in public and private organizations associated with the planning and use of natural resources and the environment. Possible employment includes areas such as multi-use land management, environmental assessment,
resource inventory, natural resource planning, law, policy analysis and land remediation.

An emphasis may be selected in policy or management. The RENR degree consists of 120 credit hours: 42 university core, 42-45 common to both emphasis areas and 24-27 designated by the emphasis area and 9 free elective hours.

**RENR Areas of Emphasis**

The BS in Renewable Natural Resources includes two emphasis areas for students to select. The directed electives available from advisors are what differentiates the emphases.

**Management Emphasis**

Designed for an education in the scientific management of integrated natural resources. In today’s world, it is important to have college graduates prepared to deal with integrated systems, accounting for all of the separate aspects of the system. The management emphasis seeks to prepare the student to integrate concerns related to land, water, air, plants and wildlife into the management process. Students select 24 credit hours of directed electives from an approved list in consultation with their advisor. The remaining 9 credit hours are free electives.

**Policy Emphasis**

Designed for students desiring an education in natural resources policy. This emphasis incorporates knowledge from all renewable natural resources disciplines, which provides a foundation for decision-making related to the environment. Students will obtain an understanding of the behavior of institutions and organizations associated with natural resource management.

Professionals associated with natural resources need to consider legislative mandates, community interests, resource evaluation and competing uses, and conflict management techniques. This emphasis prepares the student for work in private industry, public and non-profit agencies, and graduate school. Students must select 24 hours of restricted electives from an approved list in consultation with their advisor. The remaining nine hours are free electives.

**Program Requirements**

**Renewable Natural Resources Core Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<td>ESSM 301</td>
<td>Wildland Watershed Management</td>
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<td>ESSM 313</td>
<td>Vegetation Sampling Methods and Designs in Ecosystems</td>
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<td>ESSM 318</td>
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<td>RENR 375</td>
<td>Conservation of Natural Resources</td>
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<td>RENR 410</td>
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**Introduction to Natural Resources**

Select one of the following: 1

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<td>ESSM 201</td>
<td>Exploring Ecosystem Science and Management</td>
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<td>WFSC 101</td>
<td>Introduction to Wildlife and Fisheries</td>
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**Plant or Animal Taxonomy**

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<td>ESSM 302</td>
<td>Wildland Plants of North America</td>
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<td>ESSM 303</td>
<td>Agrostology</td>
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<td>ESSM 304</td>
<td>Rangeland Plant Taxonomy</td>
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<tr>
<td>WFSC 302</td>
<td>Natural History of the Vertebrates</td>
</tr>
<tr>
<td>WFSC 335</td>
<td>Natural History of the Invertebrates</td>
</tr>
</tbody>
</table>

**Policy**

Select one of the following: 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEC 350</td>
<td>Environmental and Natural Resource Economics</td>
</tr>
<tr>
<td>ESSM 406</td>
<td>Natural Resources Policy</td>
</tr>
<tr>
<td>RENR 470</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>WFSC 303</td>
<td>Fish and Wildlife Laws and Administration</td>
</tr>
</tbody>
</table>

**Ecological Restoration**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSM 320</td>
<td>Ecosystem Restoration and Management</td>
</tr>
<tr>
<td>or WFSC 418</td>
<td>Ecology of the Coastal Zone</td>
</tr>
</tbody>
</table>

**Ecological Processes**

Select two of the following: 6-8

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>ESSM 306</td>
<td>Plant Functional Ecology and Adaptation</td>
</tr>
<tr>
<td>ESSM 311</td>
<td>Biogeochemistry and Global Change</td>
</tr>
<tr>
<td>SCSC 301</td>
<td>Soil Science</td>
</tr>
<tr>
<td>WFSC 414</td>
<td>Ecology of Lakes and Rivers</td>
</tr>
<tr>
<td>WFSC 428</td>
<td>Wetland Ecosystem Management</td>
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**Seminar**

<table>
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<tr>
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<th>Course Title</th>
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<tbody>
<tr>
<td>ESSM 481</td>
<td>Senior Seminar</td>
</tr>
<tr>
<td>or WFSC 481</td>
<td>Seminar</td>
</tr>
</tbody>
</table>

**Work Experience**

Select one of the following: 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ESSM 484</td>
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</tr>
<tr>
<td>RPTS 484</td>
<td>Internship</td>
</tr>
<tr>
<td>WFSC 484</td>
<td>Internship</td>
</tr>
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</table>

Directed electives 2 24

Free electives 9

**College, University Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE 105</td>
<td>Introduction to Agricultural Economics</td>
</tr>
<tr>
<td>BIOL 101</td>
<td>Botany</td>
</tr>
<tr>
<td>or BIOL 113</td>
<td>Botany or Essentials in Biology</td>
</tr>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I &amp; CHEM 111</td>
</tr>
<tr>
<td>111</td>
<td>Fundamentals of Chemistry Laboratory I</td>
</tr>
<tr>
<td>RENR 215</td>
<td>Fundamentals of Ecology–Laboratory</td>
</tr>
<tr>
<td>American history electives (p. 23) 3 6</td>
<td></td>
</tr>
</tbody>
</table>

Communications electives (p. 20) 3 6

Creative arts elective (p. 22) 3 3

Government/Political science electives (p. 23) 4 6

Language, philosophy, and cultural elective (p. 21) 3 3

Mathematics electives (MATH prefix preferred) (p. 20) 6

**Total Semester Credit Hours** 120

1 Students will complete an internship, study abroad or independent research experience.

2 To be selected from an approved list in consultation with an advisor.
The graduation requirements include a requirement for 6 hours of international and cultural diversity courses. A course satisfying a core category, a college/department requirement, or a free elective can be used to satisfy this requirement. See academic advisor.

Credit by examination may be used to substitute for 3 hours of POLS 206 or POLS 207.

Spatial Sciences - BS

A degree in Spatial Sciences offers students the opportunity to obtain a career in a cutting-edge discipline at the intersection of environmental and spatial sciences. The spatial sciences combine multidisciplinary fields of scientific study with geospatial technologies including Geographic Information Systems (GIS), Global Positioning Systems (GPS), and Remote Sensing. A spatial sciences graduate will possess an advanced knowledge of these technologies, experience in interpretation of aerial photographs and processing of satellite images, as well as a broad understanding of computer applications and database management. Graduates are capable of working as environmental and natural resource managers and possess the necessary skills to map geographical features, patterns, and changes. Furthermore, these individuals will be able to lead and conduct modern environmental management activities.

Through core and supporting coursework, students will learn to utilize the full potential of the spatial sciences in real-world problem solving. From real-time wildfire risk assessment to crime analysis, habitat mapping for endangered species, and evaluating environmental damage from natural disasters, the spatial sciences are an integral part of modern resource management.

Students in this degree program receive guidance from faculty advisors in their areas of interest, and meet regularly to discuss courses and career opportunities. The total number of credit hours required for graduation is 120.

Program Requirements

Ecosystem Science and Management Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEC 350</td>
<td>Environmental and Natural Resource Economics</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 201</td>
<td>Exploring Ecosystem Science and Management</td>
<td>1</td>
</tr>
<tr>
<td>ESSM 301</td>
<td>Wildland Watershed Management</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 302</td>
<td>Wildland Plants of North America</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 306</td>
<td>Plant Functional Ecology and Adaptation</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 311</td>
<td>Biogeochemistry and Global Change</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 313</td>
<td>Vegetation Sampling Methods and Designs in Ecosystems</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 318</td>
<td>Coupled Social and Ecological Systems</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 320</td>
<td>Ecosystem Restoration and Management</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 351</td>
<td>Geographic Information Systems for Resource Management</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 406</td>
<td>Natural Resources Policy</td>
<td>3</td>
</tr>
<tr>
<td>or RENR 470</td>
<td>Environmental Impact Assessment</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 481</td>
<td>Senior Seminar</td>
<td>1</td>
</tr>
<tr>
<td>RENR 205</td>
<td>Fundamentals of Ecology</td>
<td>3</td>
</tr>
<tr>
<td>SCSC 301</td>
<td>Soil Science</td>
<td>4</td>
</tr>
</tbody>
</table>

Spatial Science Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSM 444</td>
<td>Remote Sensing of the Environment</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 459</td>
<td>Spatial Databases and Programming</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 460</td>
<td>Spatial Data Acquisition with Field Methods</td>
<td>2</td>
</tr>
<tr>
<td>or GEOL 352/</td>
<td>or GNSS in the Geosciences</td>
<td></td>
</tr>
<tr>
<td>GEOG 352</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESSM 462/</td>
<td>Advanced GIS Analysis for Natural Resource Management</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 462</td>
<td>Management</td>
<td></td>
</tr>
<tr>
<td>ESSM 464</td>
<td>Spatial Project Management</td>
<td>3</td>
</tr>
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</table>

Directed electives 1 15

Free electives 10

University Core Curriculum

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEC 105</td>
<td>Introduction to Agricultural Economics</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 101</td>
<td>Botany</td>
<td>4</td>
</tr>
<tr>
<td>or BIOL 113</td>
<td>or Essentials in Biology</td>
<td>6</td>
</tr>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
<td></td>
</tr>
<tr>
<td>RENR 215</td>
<td>Fundamentals of Ecology–Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>American history electives (p. 23) 2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Communication electives (p. 20) 2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Creative arts elective (p. 22) 2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Government/Psychology electives (p. 23) 2,3</td>
<td>6</td>
<td></td>
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<tr>
<td>Language, philosophy and culture elective (p. 21) 2</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mathematics electives (MATH prefix required) (p. 20)</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 120

1 To be selected in consultation with an advisor.

2 The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement. See academic advisor.

3 Credit by examination may be used to substitute 3 hours of POLS 206 or POLS 207.

Forestry - Minor

The Department of Ecosystem Science and Management offers a minor in Forestry.

Program Requirements

Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSM 203</td>
<td>Forest Trees of North America</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 309</td>
<td>Forest Ecology</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 319</td>
<td>Principles of Forestry</td>
<td>4</td>
</tr>
<tr>
<td>ESSM 405</td>
<td>Forest Resource Assessment and Management</td>
<td>3</td>
</tr>
</tbody>
</table>

Elective Courses

Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSM 300</td>
<td>Field Studies in Forest Ecosystems</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 301</td>
<td>Wildland Watershed Management</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 307</td>
<td>Forest Protection</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 406</td>
<td>Natural Resources Policy</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 16

Students must make a grade of “C” or better in all courses.

Minimum of 15 hours required.
Rangeland Ecology and Management - Minor

The Department of Ecosystem Science and Management offers a minor in Rangeland Ecology and Management.

Program Requirements

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSM 302</td>
<td>Wildland Plants of North America</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 303</td>
<td>Agrostology</td>
<td></td>
</tr>
<tr>
<td>ESSM 304</td>
<td>Rangeland Plant Taxonomy</td>
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<tr>
<td>ESSM 314</td>
<td>Principles of Rangeland Management Around the World</td>
<td>3</td>
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Select 6 semester credit hours from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
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<tbody>
<tr>
<td>ESSM 301</td>
<td>Wildland Watershed Management</td>
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<tr>
<td>ESSM 316</td>
<td>Range Ecology</td>
<td></td>
</tr>
<tr>
<td>ESSM 317</td>
<td>Vegetation Management</td>
<td></td>
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<tr>
<td>ESSM 320</td>
<td>Ecosystem Restoration and Management</td>
<td></td>
</tr>
<tr>
<td>ESSM 416</td>
<td>Fire Ecology and Natural Resource Management</td>
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<tr>
<td>ESSM 420</td>
<td>Ecological Restoration of Wetland and Riparian Systems</td>
<td></td>
</tr>
<tr>
<td>ESSM 415</td>
<td>Range Analysis and Management Planning</td>
<td>4</td>
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<tr>
<td>or RENR 410 or Ecosystem Management</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 16

Students must make a grade of "C" or better in all courses.

Spatial Sciences - Minor

The minor in Spatial Sciences requires a minimum of 15 hours.

Program Requirements

ESSM 444 Remote Sensing of the Environment 3
ESSM 462/ GEOG 462 Advanced GIS Analysis for Natural Resource Management 3

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
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<tbody>
<tr>
<td>ESSM 351</td>
<td>Geographic Information Systems for Resource Management</td>
<td>3</td>
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<tr>
<td>GEOG 390</td>
<td>Principles of Geographic Information Systems</td>
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</tr>
<tr>
<td>RENR 405</td>
<td>GIS for Environmental Problem Solving</td>
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Select two of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
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</thead>
<tbody>
<tr>
<td>ESSM 459</td>
<td>Spatial Databases and Programming</td>
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<tr>
<td>ESSM 460</td>
<td>Spatial Data Acquisition with Field Methods</td>
<td></td>
</tr>
<tr>
<td>ESSM 464</td>
<td>Spatial Project Management</td>
<td></td>
</tr>
<tr>
<td>GEOG 352</td>
<td>GNSS in the Geosciences</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 15

Students must complete a minimum of 6 hours in residence at the 300-400 level.

Students must maintain a 2.0 or above in minor curriculum.

Watershed - Certificate

The goal of the watershed certificate is to provide a rigorous and high quality program that will produce graduates capable of working as a professional in watersheds or hydrology fields, but with very solid scientific and ecological foundation. Graduates will be qualified to work in government or consulting or if they choose, be prepared to pursue graduate training in any watershed/hydrology science program. Training will be built on a solid foundation in watershed management and hydrology.

Program Requirements

Required Courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
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</thead>
<tbody>
<tr>
<td>ESSM 301</td>
<td>Wildland Watershed Management</td>
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</tr>
<tr>
<td>ESSM 305</td>
<td>Watershed Analysis and Planning</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 434</td>
<td>Hydrology and Environment</td>
<td>4</td>
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<td>GEOL 410</td>
<td>Hydrogeology</td>
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Select two from the following:

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<th>Title</th>
<th>Credit</th>
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<td>ATMO 201</td>
<td>Weather and Climate</td>
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<td>BESC 320</td>
<td>Water and the Bioenvironmental Sciences</td>
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<td>BESC 403</td>
<td>Sampling and Environmental Monitoring</td>
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<tr>
<td>ESSM 311</td>
<td>Biogeochemistry and Global Change</td>
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<tr>
<td>ESSM 440</td>
<td>Wetland Delineation</td>
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<tr>
<td>GEOG 324</td>
<td>Global Climatic Regions</td>
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<tr>
<td>GEOG 331</td>
<td>Geomorphology</td>
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<tr>
<td>GEOG 361</td>
<td>Remote Sensing in Geosciences</td>
<td></td>
</tr>
<tr>
<td>GEOG 370</td>
<td>Coastal Processes</td>
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</tr>
<tr>
<td>GEOG 370</td>
<td>MARS Coastal Processes</td>
<td></td>
</tr>
<tr>
<td>GEOL 410</td>
<td>Hydrology</td>
<td></td>
</tr>
<tr>
<td>GEOL 420</td>
<td>Environmental Geology</td>
<td></td>
</tr>
<tr>
<td>RENR 470</td>
<td>Environmental Impact Assessment</td>
<td></td>
</tr>
<tr>
<td>SCSC 301</td>
<td>Soil Science</td>
<td></td>
</tr>
<tr>
<td>WFSC 414</td>
<td>Ecology of Lakes and Rivers</td>
<td></td>
</tr>
<tr>
<td>WFSC 428</td>
<td>Wetland Ecosystem Management</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 19

Department of Entomology

The Department of Entomology at Texas A&M University is one of the top entomology departments in the United States. We offer two undergraduate degrees, a Bachelor of Science degree in Entomology and a Bachelors of Science degree in Forensic and Investigative Sciences (FIVS). Our FIVS degree is the only bachelor's degree in the state of Texas that is nationally accredited by the Forensic Science Education Programs Accreditation Commission (FEPAC) of the American Academy of Forensic Sciences. Both undergraduate degrees provide students with the necessary curriculum requirements to pursue graduate study in entomology, as well as in other professional fields, such as law and medicine.

Faculty

Behmer, Spencer T, Professor
Entomology
PhD, University of Arizona, 1998
Bernal, Julio S, Professor
Entomology
PhD, University of California, Riverside, 1995

Brundage, Adrienne L, Assistant Lecturer
Entomology
PhD, Texas A&M University, 2012

Coates, Craig J, Associate Professor
Entomology
PhD, Australian National University, 1996

Coulson, Robert N, Professor
Entomology
PhD, University of Georgia, 1969

Eubanks, Micky D, Professor
Entomology
PhD, University of Maryland, 1997

Gold, Roger E, Senior Professor
Entomology
PhD, University of California, Berkeley, 1974

Hamer, Gabriel L, Assistant Professor
Entomology
PhD, Michigan State University, 2008

Heinz, Kevin M, Professor
Entomology
PhD, University of California, Riverside, 1989

Johnston, J S, Professor
Entomology
PhD, University of Arizona, 1972

Medina, Raul F, Associate Professor
Entomology
PhD, University of Maryland, 2005

Metz, Bradley N, Assistant Lecturer
Entomology
PhD, Texas A&M University, 2009

Oswald, John D, Professor
Entomology
PhD, Cornell University, 1991

Pietrantonio, Patricia, Professor
Entomology
PhD, University of California, Riverside, 1995

Ragsdale, David W, Professor and Head
Entomology
PhD, Louisiana State University, 1980

Rangel Posada, Juliana, Assistant Professor
Entomology
PhD, Cornell University, 2010

Slotman, Michel A, Associate Professor
Entomology
PhD, Yale University, 2003

Song, Hojun, Assistant Professor
Entomology
PhD, Ohio State University, 2006

Sword, Gregory A, Professor
Entomology
PhD, University of Texas, Austin, 1998

Tambrindeguy, Cecilia, Associate Professor
Entomology
PhD, Institut National Polytechnique de Toulouse, 2004

Tarone, Aaron M, Associate Professor
Entomology
PhD, Michigan State University, 2007

Teel, Pete D, Professor
Entomology
PhD, Oklahoma State University, 1978

Tomberlin, Jeffery K, Associate Professor
Entomology
PhD, University of Georgia, 2001

Vargo, Edward L, Professor
Entomology
PhD, University of Georgia, 1986

Vinson, S B, Professor
Entomology
PhD, Mississippi State University, 1965

Wilson, Lloyd T, Professor
Entomology
PhD, University of California, Davis, 1977

Woolley, James B, Professor
Entomology
PhD, University of California, Riverside, 1983

Zhu Salzman, Keyan, Professor
Entomology
PhD, Purdue University, 1994

Majors
• Bachelor of Science in Entomology (p. 146)
• Bachelor of Science in Forensic and Investigative Sciences, Pre-Law Emphasis (p. 149)
• Bachelor of Science in Forensic and Investigative Sciences, Science Emphasis (p. 150)

Minors
• Entomology Minor (p. 151)

Certificates
• Public Health Entomology Certificate (p. 152)

Entomology - BS

Entomology is a basic and applied science of insects and their relatives such as ticks and mites. Insects are the most numerous and diverse forms of life on earth; they are essential constituents of virtually every terrestrial and aquatic ecosystem. While society benefits from the many diverse
roles played by the vast majority of insects, some species may become limiting factors in the production, processing and storage of our food and fiber crops, and to the health and well being of humans and animals. The knowledge and skills possessed by entomologists are essential components of modern integrated pest management strategies designed to safely and efficiently produce adequate food supplies for a continuously expanding world population, and to impede the transmission of insect-borne diseases, while at the same time protecting our endangered species and fragile ecosystems.

The Bachelor of Science degree in Entomology leads to a wide array of career paths with strong employment demands among corporate and private agribusiness; urban pest management companies; scientific and technical organizations; public health agencies; local, state and federal governments; and international organizations. In addition, employment opportunities exist in areas such as forensic entomology, conservation biology, environmental quality, food quality, regulatory inspection, public health and many more. Our curriculum is sufficiently flexible such that a student, in consultation with the academic advisor, may tailor the degree to meet their individual academic goals, including requirements for graduate school, professional schools in the health career areas (medical, veterinary, dental) as well as providing the analytical skills needed for law school. Our department also participates in the Texas A&M accelerate online program for teaching certification, which is an innovative approach to training Texas secondary science teachers to gain the background education needed to prepare for certification to teach science grades 8–12.

Students majoring in related areas such as agronomy, animal science, horticulture, biology, genetics and biomedical sciences may wish to consider augmenting their knowledge base and broaden their career opportunities by electing to either double major or to minor in entomology. Interested students should contact the departmental Undergraduate Advisor for additional information on these options.

Program Requirements

<table>
<thead>
<tr>
<th>First Year</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
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<tr>
<td>AGLS 101 Modern Agricultural Systems and Renewable Natural Resources</td>
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<tr>
<td>BIOL 111 Introductory Biology I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 101 Fundamentals of Chemistry I</td>
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<tr>
<td>CHEM 111 Fundamentals of Chemistry Laboratory I</td>
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<td>ENTO 201 General Entomology</td>
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<td>MATH 141 Business Mathematics I</td>
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<td>BIOL 112 Introductory Biology II</td>
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<td>MATH 131 Mathematical Concepts—Calculus</td>
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<td>MATH 142 Business Mathematics II</td>
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<td>MATH 167 For All Practical Purposes</td>
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<td>PHIL 240 Introduction to Logic</td>
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Second Year

| Term Semester Credit Hours | 14 |
| Fall                     |     |
| ENTO 482 Occupational and Professional Development | 2 |
| POLS 206 American National Government | 3 |
| CHEM 222 or CHEM 227 Chemistry or Organic Chemistry I | 3 |
| American History elective (p. 23) | 3 |
| Social and behavioral sciences elective (p. 23) | 3 |
| Elective | 1 |
| Spring     |                       |
| POLS 207 State and Local Government | 3 |
| American history elective (p. 23) | 3 |
| Communication elective (p. 20) | 3 |
| Language, philosophy and culture elective (p. 21) | 3 |
| Technical elective | 3 |
| Term Semester Credit Hours | 15 |

Third Year

| Term Semester Credit Hours | 16 |
| Fall                     |     |
| ENTO 305 Evolution of Insect Structure | 3 |
| ENTO 306 Insect Physiology | 3 |
| Elective | 3 |
| Technical electives | 7 |
| Spring     |                       |
| ENTO 301 Biodiversity and Biology of Insects | 4 |
| ENTO 424 Insect Ecology | 3 |
| GENE 301 Comprehensive Genetics | 4 |
| & GENE 312 Comprehensive Genetics Laboratory | |
| Creative arts elective (p. 22) | 3 |
| Term Semester Credit Hours | 14 |

Fourth Year

| Term Semester Credit Hours | 15 |
| Fall                     |     |
| ENTO 428 Insect Biotechnology | 3 |
| ENTO 429 Insect Biotechnology Laboratory | 1 |
| ENTO 481 Seminar | 1 |
| Elective | 3 |
| Technical electives | 7 |
| Spring     |                       |
| ENTO 435 Case Studies in Problem Solving | 3 |
| ENTO 484 or ENTO 491 Professional Internship or Research | 2 |
| Electives | 5 |
| Technical electives | 6 |
| Term Semester Credit Hours | 16 |

Total Semester Credit Hours: 120
To be selected in consultation with student’s academic advisor in the department. Six hours of international and cultural diversity electives are required for graduation; these courses may fulfill other degree requirements as well. See the list of approved courses.

Technical electives must be selected in consultation with the student’s advisor or from the current list of approved electives published by the department. See Technical Electives table.

### Additional Requirements for Baccalaureate Degree

- Foreign Language (two years same language in HS, one yr college)
- Writing Intensive Courses (two courses designated W in major or one W and one C course in major)
- International and Cultural Diversity Courses (two courses for six credit hours)

### Technical Electives

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<td>AGEC 314</td>
<td>Marketing Agricultural and Food Products</td>
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<td>AGEC 330</td>
<td>Financial Management in Agriculture</td>
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<td>Agribusiness Management</td>
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<td>AGSM 335</td>
<td>Water and Soil Management</td>
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<td>AGSM 337</td>
<td>Technology for Environmental and Natural Resource Engineering</td>
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<td>ALED 440</td>
<td>Leading Change</td>
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<td>ANSC 305</td>
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<td>ANSC 307/</td>
<td>Meats</td>
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<tr>
<td>ANSC 303/</td>
<td>Principles of Animal Nutrition</td>
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<td>Honey Bee Biology</td>
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<td>Field-Crop Insects</td>
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<td>FIVS 431 The Science of Forensic Entomology</td>
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<td>FIVS 432 Applied Forensic Entomology</td>
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<td>BIOL 406 Bacterial Genetics</td>
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<td>Issues in Horticulture</td>
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<td>SCSC 105</td>
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<td>SCSC 301</td>
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<td>Crop Ecology</td>
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<td>Plant Breeding and Genetics</td>
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<td>SCSC 306</td>
<td>Grain, Fiber and Oilseed Crops</td>
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<td>Soil and Water Microbiology</td>
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<td>Soil Fertility and Plant Nutrient Management</td>
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<td>BIOL 487 Biomedical Parasitology</td>
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Forensic and Investigative Sciences - BS, Pre-Law Emphasis

Forensic and Investigative Sciences, an accredited program by the Forensic Science Education Programs Accreditation Commission (FEPAC), is a major offered by the Department of Entomology and is a growing area of interest for students seeking to gain entry into careers that deal with the collection, preservation, processing and use of evidentiary information to solve problems. A life sciences-based education, which develops skills in problem solving and critical thinking, is essential for career opportunities in this field. Forensic and investigative scientists rely upon state-of-the-art scientific discoveries and technologies as tools to seek answers to critical questions in a variety of settings. Molecular, organismal, environmental, and ecological sources of information are often analyzed and interpreted in industrial, regulatory, legal, medical and associated professions. Graduates will be competitive for employment opportunities in quality assurance laboratories, homeland security and investigative services at local, state and national levels. Graduates will also be well prepared for opportunities to enter post-graduate studies or professional schools including medicine, law, and veterinary medicine.

Interactions with and among plants, animals and microbes occur regularly. These interactions impact public and environmental health and require life science-based forensic and investigative science to improve the quality of life. Homeland security, criminal investigation, environmental quality, agricultural and public health offer careers for students with forensic and investigative skills. Students can also pursue avenues to forensic careers through degree programs in specialty areas such as chemistry, anthropology, physics, computer science and business.

Forensic and investigative sciences also operate at the crossroads of science and the legal profession, and provide opportunities for students to consider pre-law preparation. There are growing demands for attorneys with knowledge and understanding of science and research to address legal issues and cases where the interpretation of science and/or scientific data and analyses are pivotal. Law schools often seek candidates with diverse backgrounds and interests, and they look closely at curricula that stress analytical and problem-solving skills, critical reading abilities, writing skills, oral communication and listening abilities, general research skills, and task organization and management skills. The Forensic and Investigative Sciences program provides students with opportunities to build these essential skills and knowledge areas through a combination of required and elective courses.

The Forensic and Investigative Sciences program requires students to earn a grade of C or better in all courses within the program curriculum.

Program Requirements

Forensic and Investigative Sciences Core Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>FIVS 205</td>
<td>Introduction to Forensic and Investigative Sciences</td>
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<tr>
<td>FIVS 308</td>
<td>Forensic Implications of Inheritance</td>
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<td>FIVS 316</td>
<td>Biotechnology and Forensics</td>
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<td>FIVS 401/</td>
<td>Forensic Soil Science</td>
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<td>SCSC 401</td>
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<td>FIVS 415</td>
<td>Practice and Principles of Science and Law</td>
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<td>FIVS 422</td>
<td>Crime Scene Investigation</td>
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<td>FIVS 431/</td>
<td>The Science of Forensic Entomology</td>
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<td>ENTO 431</td>
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Natural Science Core Requirements

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<td>and Introductory Biology II</td>
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<tr>
<td>CHEM 101</td>
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<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
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<td>CHEM 102</td>
<td>Fundamentals of Chemistry II</td>
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<td>CHEM 222</td>
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<td>MATH 141</td>
<td>Business Mathematics I</td>
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<tr>
<td>or MATH 166</td>
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Select one of the following:

- MATH 142 Business Mathematics II
- PHIL 240 Introduction to Logic
- MATH 131 Mathematical Concepts—Calculus
- PHYS 201 College Physics
- & PHYS 202 and College Physics
- STAT 303 Statistical Methods

Life Science Core Requirements

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<td>BICH 303</td>
<td>Elements of Biological Chemistry</td>
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Directed Electives

Category 1

Select one of the following:

- AGEC 105 Introduction to Agricultural Economics
- AGEC 315 Food and Agricultural Sales
- AGEC 344 Food and Agricultural Law
- AGEC 350 Environmental and Natural Resource Economics
- AGEC 429 Agricultural Policy
- ECON 202 Principles of Economics
- ECON 322 Applied Microeconomic Theory
- ECON 323 Microeconomic Theory
- ECON 420 Law and Economics
- ESSM 406 Natural Resources Policy
- MGMT 209 Business, Government and Society
- MGMT 212 Business Law
- POLS 351 Law and Legislation
- POLS 356 Law, Politics and Policy
- PSYC 305 Psychology of Adjustment
- SOCI 211 Sociology of Deviance
- SOCI 314 Social Problems
- URPN 361 Urban Issues
- URPN 401 Policy Implementation
- URPN 450 Emergency Management Principles and Practices
- WFSC 303 Fish and Wildlife Laws and Administration

1. This course is offered as FIVS 482 or FIVS 491.
2. This course is offered as PSYC 305 or PSYC 306.
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Program Requirements

Forensic and Investigative Sciences Core Requirements

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<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
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<td>FIVS 205</td>
<td>Introduction to Forensic and Investigative Sciences</td>
<td>3</td>
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<td>FIVS 308</td>
<td>Forensic Implications of Inheritance</td>
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<td>FIVS 316</td>
<td>Biotechnology and Forensics</td>
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<td>FIVS 401/SCSC 401</td>
<td>Forensic Soil Science</td>
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<td>FIVS 415</td>
<td>Practice and Principles of Science and Law</td>
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<td>FIVS 422</td>
<td>Crime Scene Investigation</td>
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<td>The Science of Forensic Entomology</td>
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Natural Science Core Requirements

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<td>FIVS 484</td>
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</table>
CoLS 101 Introductory Biology I
& COIS 112 and Introductory Biology II
& CHEM 101 Fundamentals of Chemistry I
& CHEM 111 and Fundamentals of Chemistry Laboratory I
& CHEM 102 Fundamentals of Chemistry II
& CHEM 112 and Fundamentals of Chemistry Laboratory II
CHEM 227 Organic Chemistry I
& CHEM 237 and Organic Chemistry Laboratory
CHEM 228 Organic Chemistry II
& CHEM 238 and Organic Chemistry Laboratory
CHEM 316 Quantitative Analysis
& CHEM 318 and Quantitative Analysis Laboratory
MATH 141 Business Mathematics I
or MATH 166 or Topics in Contemporary Mathematics II
Select one of the following:
MATH 142 Business Mathematics II
MATH 131 Mathematical Concepts-Calculus
MATH 171 Analytic Geometry and Calculus
PHYS 201 College Physics
& PHYS 202 and College Physics
STAT 302 Statistical Methods

Life Science Core Requirements
AGLS 101 Modern Agricultural Systems and Renewable Natural Resources
BICH 410 Comprehensive Biochemistry I
& BICH 411 and Comprehensive Biochemistry II
BICH 412 Biochemistry Laboratory I

Directed Electives
Select seven hours from the following:
ANTH 225 Introduction to Biological Anthropology
ANTH 427 Human Variation
BIOL 213 Molecular Cell Biology
BIOL 319 Integrated Human Anatomy and Physiology I
BIOL 320 Integrated Human Anatomy and Physiology II
BIOL 351 Fundamentals of Microbiology
BIOL 413 Cell Biology
BIOL 430 Biological Imaging
BIOL 454 Immunology
CHEM 318 Quantitative Analysis Laboratory
CHEM 320 Instrumental Analysis Laboratory
CHEM 325 Physical Chemistry Laboratory I
CHEM 326 Physical Chemistry Laboratory II
CHEM 327 Physical Chemistry I
CHEM 328 Physical Chemistry II
CHEM 362 Descriptive Inorganic Chemistry
CHEM 415 Analytical Chemistry
CHEM 434 Analytical Instrumentation Laboratory
DASC 326/ Food Bacteriology
FSTC 326
ENTO 403 Urban Entomology
ENTO 423 Medical Entomology
ENTO 428 Insect Biotechnology
ENTO 429 Insect Biotechnology Laboratory
FIVS 421 Latent Print Processing
FSTC 326/ Food Bacteriology
GENE 412 Population and Ecological Genetics
GENE 420 Bioethics
GENE 450 Recombinant DNA and Biotechnology
PHYS 221 Optics and Thermal Physics
PSYC 305 Psychology of Adjustment
PSYC 306 Abnormal Psychology
PSYC 371 Forensic Psychology
SCSC 301 Soil Science
SOCI 301 Criminology
VIBS 301 Biomedical Anatomy
VTPB 405 Biomedical Microbiology
VTPP 425 Pharmacology

University Core Curriculum Requirements
American History (p. 23) 6
Government/Poliical science (p. 23) 6
Communication (p. 20) 6
Creative arts (p. 22) 3
Language, philosophy and culture elective (p. 21) 3
Social and behavioral science (p. 23) 3

General Elective Requirement
General elective 3
Total Semester Credit Hours 120

1 This course fulfills a writing requirement. See Requirement for a Baccalaureate Degree section.

Entomology - Minor

The minor in Entomology is available to all students enrolled at Texas A&M University. The courses listed constitute the minimum 17 hours required for a minor in Entomology.

1. Students must earn a grade of C or better in each course used for the minor.
2. Prerequisite Courses: All prerequisites for each core and elective course also must be met. Prerequisite courses will not be applied to the minor requirements and do not count toward the number of hours needed to complete the minor. Please refer to the Texas A&M University Undergraduate Catalog for a listing of course prerequisites.
3. Availability of courses and minor recognition: The Department of Entomology cannot guarantee the availability of the courses required to meet the minor requirements. Successful completion of the minor will be certified by a degree audit in Howdy during the semester of the student's graduation. The minor will be recognized after graduation on the student’s transcript, but not on the student’s diploma.

Students pursuing the Minor in Entomology are to complete the minor application form (https://insects.tamu.edu/futurestudents/minors/Minor_%20Entomology%20Form-FINAL.pdf) and submit the document to the Department of Entomology Advising Office in 404 Minnie Belle Heep Building (HPCT).

Program Requirements
Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTO 482</td>
<td>Occupational and Professional Development 1</td>
<td>2</td>
</tr>
<tr>
<td>ENTO 301</td>
<td>Biodiversity and Biology of Insects 1</td>
<td>3-4</td>
</tr>
<tr>
<td>or</td>
<td>ENTO 313 or Biology of Insects</td>
<td></td>
</tr>
</tbody>
</table>

Directed Electives 12

Select from the following list:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTO 300/ Field Studies</td>
<td></td>
</tr>
<tr>
<td>WFSC 300</td>
<td></td>
</tr>
<tr>
<td>ENTO 305 Evolution of Insect Structure</td>
<td></td>
</tr>
<tr>
<td>ENTO 306 Insect Physiology</td>
<td></td>
</tr>
<tr>
<td>ENTO 315 Biotechnology and Society</td>
<td></td>
</tr>
<tr>
<td>ENTO 320 Honey Bee Biology</td>
<td></td>
</tr>
<tr>
<td>ENTO 322 Insects and Human Society</td>
<td></td>
</tr>
<tr>
<td>ENTO 401 Principles of Integrated Pest Management</td>
<td></td>
</tr>
<tr>
<td>ENTO 402 Field-Crop Insects</td>
<td></td>
</tr>
<tr>
<td>ENTO 403 Urban Entomology</td>
<td></td>
</tr>
<tr>
<td>ENTO 423 Medical Entomology</td>
<td></td>
</tr>
<tr>
<td>ENTO 424 Insect Ecology</td>
<td></td>
</tr>
<tr>
<td>ENTO 428 Insect Biotechnology</td>
<td></td>
</tr>
<tr>
<td>ENTO 429 Insect Biotechnology Laboratory</td>
<td></td>
</tr>
<tr>
<td>ENTO 431/ The Science of Forensic Entomology</td>
<td></td>
</tr>
<tr>
<td>FIVS 431</td>
<td></td>
</tr>
<tr>
<td>ENTO 432/ Applied Forensic Entomology</td>
<td></td>
</tr>
<tr>
<td>FIVS 432</td>
<td></td>
</tr>
<tr>
<td>ENTO 435 Case Studies in Problem Solving</td>
<td></td>
</tr>
<tr>
<td>ENTO 450/ Caribbean Conservation</td>
<td></td>
</tr>
<tr>
<td>WFSC 450</td>
<td></td>
</tr>
<tr>
<td>ENTO 451/ Caribbean Research Seminar</td>
<td></td>
</tr>
<tr>
<td>WFSC 451</td>
<td></td>
</tr>
<tr>
<td>ENTO 481 Seminar</td>
<td></td>
</tr>
<tr>
<td>ENTO 484 Professional Internship</td>
<td></td>
</tr>
<tr>
<td>ENTO 485 Directed Studies</td>
<td></td>
</tr>
<tr>
<td>ENTO 489 Special Topics in...</td>
<td></td>
</tr>
<tr>
<td>ENTO 491 Research</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 17

1 Substitutions are not allowed for core courses.

Students are encouraged to visit the Department of Entomology Advising Office in 404 Minnie Belle Heep Building (HPCT), West Campus, to select the appropriate directed elective courses based on their individual educational and career interests.

Public Health Entomology - Certificate

Population growth and distribution predicted over future decades pose increased risks of disease outbreaks and emergence of new diseases worldwide. Scientists from many disciplines, physicians, veterinarians, health-care practitioners, public health workers and policy makers are needed to provide public health surveillance, make new discoveries, and find solutions to address these risks.

This certificate offers a 15 credit-hour concentration in Public Health Entomology focused on insects and other arthropods that serve as vectors and reservoirs of disease pathogens, and are responsible for the direct and indirect causation of disease.

Employment opportunities in the public health sector include environmental and health service agencies, mosquito control districts, the Centers for Disease Control and Prevention (CDC), the Department of Defense, the World Health Organization, and the PanAmerican Health Organization.

Students completing this certificate will be competitive for employment upon graduation, for graduate programs in related disciplines, such as Master’s programs in Public Health, Epidemiology, and Entomology, as well as professional schools.

Eligibility Requirements for Entrance:

1. Completion of a minimum of one (1) course from Category I and/or II with a grade of “B” or better and a cumulative TAMU GPA of 2.0+
2. Students must complete application at least 2 long semesters prior to expected graduation.

Program Requirements

CATEGORY I -- Select one of the following: 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTO 210</td>
<td>Global Public Health Entomology</td>
</tr>
<tr>
<td>VTPB 221</td>
<td>Great Diseases of the World</td>
</tr>
<tr>
<td>BESC 314</td>
<td>Pathogens, the Environment and Society</td>
</tr>
</tbody>
</table>

CATEGORY II - Must complete both courses: 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTO 208</td>
<td>Veterinary Entomology</td>
</tr>
<tr>
<td>ENTO 423</td>
<td>Medical Entomology</td>
</tr>
</tbody>
</table>

CATEGORY III -- Select one of the following: 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTO 403</td>
<td>Urban Entomology</td>
</tr>
<tr>
<td>VIBS 432</td>
<td>Public Health Practices</td>
</tr>
<tr>
<td>VTPB 409</td>
<td>Introduction to Immunology</td>
</tr>
<tr>
<td>VIBS 204</td>
<td>Fundamentals of Food Toxicology and Safety</td>
</tr>
<tr>
<td>HLTH 354</td>
<td>Medical Terminology for the Health Professions</td>
</tr>
</tbody>
</table>

CATEGORY IV - Required Capstone Course: 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENTO 425</td>
<td>Disease Ecology</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 15

To Complete the Certification, Students Must:

- Successfully complete courses in Category I-III PRIOR to enrollment in Category IV ENTO 425 – Disease Ecology
- Complete all courses within the certification with a minimum grade of “C”
- Earn a cumulative 3.0+ GPA within the certificate courses
- Complete exit survey
- Meet the minimum qualifications for graduation as defined by Texas A&M University including a 2.0 cumulative GPA

For additional information and to discuss the scheduling of these courses upon successful completion of your entrance requirements, please contact a member of the Entomology Academic Advising Team to schedule an appointment to submit your Public Health Certificate Application (http://xy0w83avw2t3b0zf12evohjl.wpengine.netdna-cdn.com/wp-content/uploads/sites/12/2014/11/CERTIFICATE-IN-PUBLIC-HEALTH-ENTOMOLOGY-Application-New.pdf).
Department of Horticultural Sciences

Horticulture encompasses a unique blend of art, science and technology. Horticultural crops include trees, shrubs, tropical plants, ornamental grasses, herbs, flowers, fruits, vegetables and nuts which are grown and utilized throughout the world. The Department of Horticultural Sciences offers two undergraduate degrees: a Bachelor of Science in Horticulture and a Bachelor of Arts in Horticulture. Our flexible degree plans enable students opportunities to develop programs tailored to their unique career goals. The horticulture industry is one of the largest agricultural industries in the state and offers graduates a multitude of diverse career opportunities.

Majors

- Bachelor of Arts in Horticulture (p. 153)
- Bachelor of Science in Horticulture (p. 154)

Minors

- Horticulture Minor (p. 155)

Horticulture - BA

This degree blends traditional horticulture with the benefits derived from the human association with plants. This degree offers students the option of pairing a horticulture degree with electives in social sciences, business, education, art and design. Creative opportunities range from planning gala events, to designing tranquil gardens, to constructing educational programs for school gardens to pursuing advanced degrees. Graduates may find themselves working in exciting environments including botanical gardens, international flower markets or upscale resorts.

Program Requirements

<table>
<thead>
<tr>
<th>Horticultural Sciences Core Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>HORT 201 Horticultural Science and Practices</td>
</tr>
<tr>
<td>HORT 203 Floral Design</td>
</tr>
<tr>
<td>HORT 281 Horticulture as a Profession.</td>
</tr>
<tr>
<td>HORT 315 Issues in Horticulture</td>
</tr>
<tr>
<td>HORT 335 Sociohorticulture</td>
</tr>
<tr>
<td>HORT 481 Seminar</td>
</tr>
<tr>
<td>High Impact Learning</td>
</tr>
</tbody>
</table>

Select one of the following:

- HORT 400 Field Studies in Horticulture
- HORT 484 Internship
- HORT 485 Directed Studies
- HORT 491 Research
- HORT Study Abroad

Principles of Design |

Select two of the following:

- HORT 308 Landscape Plant Materials
- HORT 332 Horticulture Landscape Graphics
- HORT 432 Horticulture Landscape Design
- HORT 442 Horticulture Landscape Design II
- HORT 451 Retail Floristry
- HORT 452 Floral Design: Weddings and Personal Flowers

- HORT 453 Floral Art
- HORT 454 Special Event Design and Production
- Horticulure Management and Marketing | 3 |

Select one of the following:

- HORT 309 Interior Plants
- HORT 425 Landscape Maintenance and Construction
- HORT 426 International Floriculture Marketing
- HORT 451 Retail Floristry
- Horticulture Elective | 3 |
- HORT 300 to HORT 499 (p. 827) 3

Support Courses

| ENGL 210 Technical and Business Writing | 3 |
| RENR 205 Fundamentals of Ecology | 3 |
| Art or Art History | 3 |

Select one of the following:

- LAND 240 History of Landscape Architecture
- ARTS 149 Art History Survey I
- ARTS 150 Art History Survey II
- ARTS 330 The Arts of America
- ARTS 349 The History of Modern Art
- ARCH 249 Survey of World Architecture History I
- ARCH 250 Survey of World Architecture History II
- ARCH 350 History and Theory of Modern and Contemporary Architecture

- Foreign Language | 3 |
- Minor or dual major (exclusive of Minor in Horticulture or B.S. in Horticulture) 5 15-18 |
- Directed electives 6 20-23 |

University Core Curriculum

Select one of the following:

- BIOL 101 Botany
- BIOL 111 Introductory Biology I
- BIOL 113 Essentials in Biology
- CHEM 101 & CHEM 111 Fundamentals of Chemistry I
- HORT 202 Horticultural Science and Practices Laboratory |
- American history (p. 23) | 6 |
- Communication (p. 20) | 6 |
- Creative arts (p. 22) | 3 |
- Government/Political science (p. 23) | 6 |
- Language, philosophy and culture (p. 21) | 3 |
- Mathematics (MATH prefix required) (p. 20) | 6 |
- Social and behavioral science (p. 23) | 3 |

Total Semester Credit Hours 120

1 This course fulfills a writing requirement (see Requirements for a Baccalaureate Degree (p. 24)).
2 This course fulfills a communications requirement.
3 Hours to be selected based on the emphasis area chosen in consultation with the student’s academic advisor.
4 Student must successfully complete a course of a foreign language beyond that required by the university in general.
Any university approved minor or major is acceptable, except a minor or major in Horticulture as the intent is to provide a concentration in a second field of expertise.

Hours to be selected with approval by the student's academic advisor and the associate department head from 100-400-level courses in ACCT (p. 591), AGCJ (p. 603), AGEC (p. 605), AGLS (p. 610), SCSC (p. 968), ALEC (p. 614), ARTS (p. 640), BESC (p. 652), COMM (p. 688), ECON (p. 737), ENDS (p. 753), ENTO (p. 767), FINC (p. 781), ESSM (p. 772), GENE (p. 793), GEOG (p. 796), HLTH (p. 823), HORT (p. 827), INST (p. 836), ISYS (p. 843), KINE (p. 849), LAND (p. 854), MEPS (p. 878), MGMT (p. 879), MKTG (p. 886), NUTR (p. 950), RPTS (p. 959), RPTS (p. 960), SAED, SCMT (p. 966), SEFB (p. 974), SOCI (p. 976), SPAN (p. 982), SPED (p. 985), STAT (p. 990), WFSC (p. 1016).

Horticulture - BS

This degree is designed to provide students with the knowledge and skills needed for production, management and marketing of horticultural and floriculture crops. This degree also offers students with strong interests in science and/or technology opportunities in research related fields including preparation for graduate studies. Career prospects range from producing specially herb crops for upscale restaurants, to managing landscape businesses for growing communities, to marketing fruits and vegetables for healthier lifestyles. Many former students are self-employed, owning their own greenhouse, nursery or landscape operation. Others work in upper management of large corporations or travel the world developing future horticultural crops.

Program Requirements

Horticultural Science Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HORT 201</td>
<td>Horticultural Science and Practices</td>
<td>3</td>
</tr>
<tr>
<td>HORT 281</td>
<td>Horticulture as a Profession.</td>
<td>1</td>
</tr>
<tr>
<td>HORT 315</td>
<td>Issues in Horticulture</td>
<td>3</td>
</tr>
<tr>
<td>HORT 326</td>
<td>Plant Propagation</td>
<td>3</td>
</tr>
<tr>
<td>HORT 481</td>
<td>Seminar</td>
<td>2</td>
</tr>
</tbody>
</table>

High Impact Learning

Select one of the following:

- HORT 400 Field Studies in Horticulture
- HORT 484 Internship
- HORT 485 Directed Studies
- HORT 491 Research
- HORT Study Abroad

Horticultural Crop Production

Select one of the following:

- HORT 319 Fruit and Nut Production
- HORT 325 Vegetable Crop Production
- HORT 418 Nut Culture
- HORT 419 Viticulture and Small Fruit Culture
- HORT 420 Concepts of Wine Production
- HORT 423 Tropical Horticulture
- HORT 431 Nursery Production and Management

Horticulture Management and Marketing

Select one of the following:

- HORT 309 Interior Plants

Supporting Field Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 222</td>
<td>Elements of Organic and Biological Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>or CHEM 227</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GENE 310</td>
<td>Principles of Heredity</td>
<td>3</td>
</tr>
<tr>
<td>GENE 315</td>
<td>Genetics of Plants</td>
<td>3</td>
</tr>
<tr>
<td>GENE 320/ BIMS 320</td>
<td>Biomedical Genetics</td>
<td></td>
</tr>
<tr>
<td>ENTO 201</td>
<td>General Entomology</td>
<td>3</td>
</tr>
<tr>
<td>MEPS 313</td>
<td>Introduction to Plant Physiology</td>
<td>3</td>
</tr>
<tr>
<td>PLPA 301</td>
<td>Plant Pathology</td>
<td>3</td>
</tr>
<tr>
<td>PLPA 303</td>
<td>Plant Pathology Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>SCSC 301</td>
<td>Soil Science</td>
<td>4</td>
</tr>
</tbody>
</table>

RENR 205 Fundamentals of Ecology

Directed electives

University Core Curriculum

Select one of the following:

- BIOL 101 Botany
- BIOL 111 Introductory Biology I
- BIOL 113 Essentials in Biology
- CHEM 101 Fundamentals of Chemistry I & CHEM 111 and Fundamentals of Chemistry Laboratory I
- HORT 202 Horticultural Science and Practices Laboratory

American history (p. 23)

Communication (p. 20)

Creative arts (p. 22)

Government/Poltical science (p. 23)

Language, philosophy and culture (p. 21)

Mathematics (MATH prefix required) (p. 20)

Social and behavioral science (p. 23)

Total Semester Credit Hours

120

1 This course fulfills a writing intensive course requirement.

2 This course fulfills a communications requirement.

3 Hours to be selected based on the emphasis area chosen in consultation with the student's academic advisor.
4 Hours to be selected with approval by the student's academic advisor and the associate department head from 100-400-level courses in ACCT (p. 591), AGEC (p. 605), AGSM (p. 612), ALEC (p. 614), BESC (p. 652), BICH (p. 653), BIOL (p. 660), CHEM (p. 675), COSC (p. 694), ECON (p. 737), ENTO (p. 763), FINC (p. 781), ESSM (p. 772), GENE (p. 793), HLTH (p. 823), HORT (p. 827), INST (p. 836), JOUR (p. 848), LAND (p. 854), MEPS (p. 878), MGMT (p. 879), MKTG (p. 886), NUTR (p. 910), PHYS (p. 934), PLPA (p. 938), RENE (p. 959), RPTS (p. 960), SCSC (p. 968), SPAN (p. 982), STAT (p. 990), WFSC (p. 1016).

Horticulture - Minor

An undergraduate minor in Horticulture provides students a concentration of courses that focus on areas of horticulture and floriculture. These may range from a broad based, comparative perspective to a narrower application within the field. Students may choose such diverse topics as fruit and vegetable production, enology, greenhouse and nursery management, floral and landscape design, science and biotechnology, urban and environmental horticulture and much more. Earning a minor in Horticulture provides students with the skills required to have a basic working knowledge in the field of Horticulture.

Program Requirements

HORT 201 Horticultural Science and Practices 3

Upper-level requirement

Select from HORT 300-499 (p. 827) 9

Electives

Select from HORT 100-499 (p. 827) 6

Total Semester Credit Hours 18

Students must make a grade of "C" or better in all courses and must be in good academic standing with a GPA of 2.250 or above.

Department of Nutrition and Food Science

Nutritional sciences prepares majors with a comprehensive knowledge of the biological and social sciences to understand the relationships between nutrients, food components and human health. Prevention of diseases that are related to lifestyle, particularly diet and nutrition, is a focus of the curriculum. Core courses emphasize the role of nutrients in biochemistry, genetics, physiology, microbiology and immunology that promotes wellness and enhances the quality of life. The major also provides an excellent background for those interested in pursuing graduate degrees in biological, nutritional or food sciences; professional degrees in human or veterinary medicine; degrees in dentistry, pharmacy, physical therapy, nursing, public health and other health professions; or dietetic internships.

The Didactic Program in Dietetics (DPD) and the Graduate Degree/Dietetic Internship Program are accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND). Students who successfully complete the DPD and a dietetic internship are eligible to take the Registration Examination to become a Registered Dietitian (RD).

Three curriculum tracks are offered (General Nutrition, Didactic Program in Dietetics and Molecular and Experimental Nutrition) to provide flexibility in one’s chosen career path. The Nutrition major prepares one for graduate school, corporate wellness positions, health promotion programs, the food industry, public health programs, pharmaceutical sales, clinical dietetics, medical and research laboratories, biotechnology firms, government agencies and related fields. For more information, visit http://nfs.tamu.edu

Faculty

Allred, Clinton D, Associate Professor
Nutrition & Food Science
PhD, University of Illinois at Urbana-Champaign, 2002

Beathard, Karen M, Senior Lecturer
Nutrition & Food Science
MS, Texas Women's University, 1990

Chapkin, Robert S, Distinguished Professor
Nutrition & Food Science
PhD, University of California, Davis, 1986

Chew, Boon P, Professor
Nutrition & Food Science
PhD, Purdue University, 1978

Geismar, Karen S, Lecturer
Nutrition & Food Science
MS, Texas Women's University, 1998

Kubena, Karen S, Professor
Nutrition & Food Science
PhD, Texas A&M University, 1982

Lorenz, Saundra G, Lecturer
Nutrition & Food Science
MS, Texas A&M University, 2002

Murano, Elsa A, Professor
Nutrition & Food Science
PhD, Virginia Tech, 1990

Murano, Peter S, Associate Professor
Nutrition & Food Science
PhD, Virginia Tech, 1989

Riaz, Mian N, Tees Senior Research Scientist And Director
Nutrition & Food Science
PhD, University of Maine, 1992

Talcott, Stephen T, Professor
Nutrition & Food Science
PhD, University of Arkansas, 2000

Talcott, Susanne U, Associate Professor
Nutrition & Food Science
PhD, University of Florida, 2004

Turner, Nancy D, Research Professor
Nutrition & Food Science
PhD, Texas A&M University, 1995

Wu, Chaodong, Associate Professor
Nutrition & Food Science
PhD, Beijing Medical University, 1998

Majors

- Bachelor of Science in Food Science and Technology, Food Industry Option (p. 156)
• Bachelor of Science in Food Science and Technology, Food Science Option (p. 158)
• Bachelor of Science in Nutrition, Didactic Program in Dietetics Track (p. 160)
• Bachelor of Science in Nutrition, General Nutrition Track (p. 161)
  • Teacher certification in Biology and Life Sciences, Chemistry and Science
• Bachelor of Science in Nutrition, Molecular and Experimental Track (p. 163)

Food Science and Technology -
BS, Food Industry Option

Food Science and Technology is an exciting multidisciplinary field that prepares majors with a comprehensive knowledge of the biological, physical and engineering sciences to develop new food products, design innovative processing technologies, improve food quality and nutritive value, enhance the safety of foods and ensure the wholesomeness of our food supply. Food Science majors apply the principles learned in the basic sciences such as food chemistry, biochemistry, genetics, microbiology, food engineering and nutrition to provide consumers with safe, wholesome and attractive food products that contribute to their health and well-being. For more information, visit http://nfs.tamu.edu

The undergraduate curriculum is approved by the Institute of Food Technologists (IFT) and offers two tracks, a Food Science Option and an Industry Option. These tracks provide promising career opportunities in areas such as food product/process design, technical service, research and development, quality assurance, food safety, food law, regulatory oversight, technological innovation, marketing, corporate sales, sensory evaluation and operations management. There are numerous opportunities available for corporate internships, scholarships and study abroad programs that provide real-world experience and enhance opportunities for employment after completing a baccalaureate degree. The major also provides an excellent background for those interested in professional schools, graduate studies, medicine, veterinary medicine, dentistry, pharmacy, physical therapy, nursing, occupational therapy and public health.

Food Industry Option

The Food Industry option integrates knowledge from the basic disciplines of chemistry, microbiology, physics and biology and applies scientific principles from food engineering, food processing operations, sensory evaluation, food safety, HACCP, quality assurance and management to produce foods that are wholesome, affordable and safe. The goal of the curriculum is to prepare Food Technologists for careers in the food and related industries. These careers may involve food processing, manufacturing, technical service, food product development, operations management, regulatory oversight and other technology based opportunities.

Program Requirements

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## Notes:
- FSTC 406/POSC 406: Poultry Further Processing
- FSTC 410/NUTR 410: Nutritional Pharmacometrics of Food
- FSTC 440/NUTR 440: Therapeutic Microbiology: Probiotics and Related Strategies
- FSTC 446/HORT 446: Commercial Fruit and Vegetable Processing
Food Science and Technology - BS, Food Science Option

Food Science and Technology is an exciting multidisciplinary field that prepares majors with a comprehensive knowledge of the biological, physical and engineering sciences to develop new food products, design innovative processing technologies, improve food quality and nutritive value, enhance the safety of foods and ensure the wholesomeness of our food supply. Food Science majors apply the principles learned in the basic sciences such as food chemistry, biochemistry, genetics, microbiology, food engineering and nutrition to provide consumers with safe, wholesome and attractive food products that contribute to their health and well-being. For more information, visit http://nfs.tamu.edu

The undergraduate curriculum is approved by the Institute of Food Technologists (IFT) and offers two tracks, a Food Science Option and an Industry Option. These tracks provide promising career opportunities in areas such as food product/process design, technical service, research and development, quality assurance, food safety, food law, regulatory oversight, technological innovation, marketing, corporate sales, sensory evaluation and operations management. There are numerous opportunities available for corporate internships, scholarships and study abroad programs that provide real-world experience and enhance opportunities for employment after completing a baccalaureate degree.

The major also provides an excellent background for those interested in professional schools, graduate studies, medicine, veterinary medicine, dentistry, pharmacy, physical therapy, nursing, occupational therapy and public health.

Food Science Option

The Food Science option provides a strong knowledge base and fundamental understanding of chemistry, biology, engineering, physics, statistics, genetics, biochemistry, microbiology and nutrition that is applied toward the preservation, processing, packaging and distribution on foods that are wholesome, affordable and safe. The goal of the curriculum is to prepare Food Scientists for career opportunities in the food and allied industries or for further studies in graduate or professional schools. See an academic advisor for specific course listings.

Program Requirements

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Creative arts elective (p. 22)  

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<td>Food Process Engineering Technology</td>
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</table>
Students may earn a chemistry minor by taking 6 hours of additional chemistry courses. The Graduation requirements include a requirement for 6 hours in chemistry courses from an approved list as free electives. Selection can be courses that are related to lifestyle, particularly diet and nutrition, is a focus of the curriculum. Core courses emphasize the role of nutrients in biochemistry, genetics, physiology, microbiology and immunology that promotes wellness and enhances the quality of life. The major also provides an excellent background for those interested in pursuing graduate degrees in biological, nutritional or food sciences; professional degrees in human or veterinary medicine; degrees in dentistry, pharmacy, physical therapy, nursing, public health and other health professions; or dietetic internships.

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**Didactic Program in Dietetics Track**

Nutritional sciences prepares majors with a comprehensive knowledge of the biological and social sciences to understand the relationships between nutrients, food components and human health. Prevention of diseases that are related to lifestyle, particularly diet and nutrition, is a focus of the curriculum. Core courses emphasize the role of nutrients in biochemistry, genetics, physiology, microbiology and immunology that promotes wellness and enhances the quality of life. The major also provides an excellent background for those interested in pursuing graduate degrees in biological, nutritional or food sciences; professional degrees in human or veterinary medicine; degrees in dentistry, pharmacy, physical therapy, nursing, public health and other health professions; or dietetic internships.

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**Program Requirements**

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1. The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. Selection must be from courses on the approved list. Selection can be courses that also satisfy the requirement for social and behavioral sciences; creative arts; language, philosophy and culture; or electives. For Core Curriculum requirements, http://core.tamu.edu/

2. Students may earn a chemistry minor by taking 6 hours of additional chemistry courses from an approved list as free electives. See the Department of Chemistry for more details. Students seeking a minor in chemistry must complete the Declaration of Minor in Chemistry form and have it approved by the undergraduate advisor in Chemistry (Room 104 Chemistry) and their NFSC advisor.
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<th>Credit Hours</th>
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<tr>
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<td>Survey of Management</td>
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Creative Arts Elective (p. 22) and ANTH 205 satisfy both degree requirements as well as international and cultural diversity requirements.

A total of 120 hours is required for graduation; 36 hours of 300/400 level courses are required to meet the Texas A&M University residency requirement.

To be eligible to participate in the DPD program, students must maintain an overall GPR of 2.8 or above and have a grade of at least C in all non-nutrition courses and a grade of at least B in all nutrition courses. See academic advisor for information on specific course listings and eligibility requirements.

### Nutrition - BS, General Nutrition Track

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### General Nutrition Track

The General Nutrition Track provides a wide range of approved electives in biochemistry, nutrition, food science, microbiology, immunology, genetics, and psychology in order to customize a degree suited to
research interests and career objectives. Through this program, students are prepared to work in community nutrition programs, sports nutrition, education, research, and as technical representatives in the nutrition and health industry. This is also an excellent program for students wanting to go to professional schools such as medicine, dentistry, physical therapy, physician assistant, or pharmacy.

**Teacher Certification**

The secondary Provisional Teaching Certificate may be obtained in conjunction with the Bachelor of Science degree in Nutritional Sciences, General Nutrition Track. There are three subject areas available for teacher certification through this degree: Biology/Life Science (grades 8-12), Chemistry (grades 8-12), and Science (grades 8-12).

Students must also complete the STEM (Science, Technology, Engineering, Mathematics) minor. Students interested in teacher certification should contact the teacher certification advisor in the Department of Teaching, Learning and Culture in the College of Education and Human Development for more information.

**Program Requirements**

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<td>NUTR 471/FSTC 471</td>
</tr>
<tr>
<td></td>
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</tbody>
</table>

**POLS 206 | American National Government 3**
**Creative arts (p. 22) 1 | 3**
**Free elective | 6**

**Term Semester Credit Hours | 15**

**Spring**

| BIOL 319 | Integrated Human Anatomy and Physiology |
| GENE 301 | Comprehensive Genetics |
| GENE 312 | Comprehensive Genetics Laboratory |
| NUTR 430 | Community Nutrition |
| STAT 302 | Statistical Methods |
| Technical elective 3 | |
| Free elective | 3 |

**Term Semester Credit Hours | 14**

**Spring**

| BICH 411 | Comprehensive Biochemistry II |
| NUTR 470 | Nutrition and Physiological Chemistry |
| NUTR 481 | Seminar |
| Language, philosophy and culture (p. 21) | Nutrition elective |
| Select one of the following: |
| NUTR 211 | Scientific Principles of Foods |
| NUTR 300/FSTC 300 | Religious and Ethnic Foods |
| NUTR 405 | Nutritional Treatment of Disease |
| NUTR 410/FSTC 410 | Nutritional Pharmacometrics of Food Compounds |
| NUTR 440/FSTC 440 | Therapeutic Microbiology: Probiotics and Related Strategies |
| NUTR 450 | Nutrition and Metabolism of Minerals |
| NUTR 469/FSTC 469 | Experimental Nutrition and Food Science Laboratory |
| NUTR 471/FSTC 471 | Critical Evaluation of Nutrition and Food Science Literature: Evidence Based Reviews |

**Term Semester Credit Hours | 17**

**Spring**

| BICH 410 | Comprehensive Biochemistry I |
| DASC 326/FSTC 326 or BIOL 351 | Food Bacteriology or Fundamentals of Microbiology |
| NUTR 430 | Community Nutrition |
| Technical elective 3 | |
| Free elective | 3 |

**Term Semester Credit Hours | 14**

**Spring**

| BICH 411 | Comprehensive Biochemistry II |
| NUTR 470 | Nutrition and Physiological Chemistry |
| NUTR 481 | Seminar |
| Language, philosophy and culture (p. 21) | Nutrition elective |
| Select one of the following: |
| NUTR 211 | Scientific Principles of Foods |
| NUTR 300/FSTC 300 | Religious and Ethnic Foods |
| NUTR 405 | Nutritional Treatment of Disease |
| NUTR 410/FSTC 410 | Nutritional Pharmacometrics of Food Compounds |
| NUTR 440/FSTC 440 | Therapeutic Microbiology: Probiotics and Related Strategies |
| NUTR 450 | Nutrition and Metabolism of Minerals |
| NUTR 469/FSTC 469 | Experimental Nutrition and Food Science Laboratory |
| NUTR 471/FSTC 471 | Critical Evaluation of Nutrition and Food Science Literature: Evidence Based Reviews |

**Term Semester Credit Hours | 17**

**Spring**

| BICH 410 | Comprehensive Biochemistry I |
| DASC 326/FSTC 326 or BIOL 351 | Food Bacteriology or Fundamentals of Microbiology |
| NUTR 430 | Community Nutrition |
| Technical elective 3 | |
| Free elective | 3 |

**Term Semester Credit Hours | 14**

**Spring**

| BICH 411 | Comprehensive Biochemistry II |
| NUTR 470 | Nutrition and Physiological Chemistry |
| NUTR 481 | Seminar |
| Language, philosophy and culture (p. 21) | Nutrition elective |
| Select one of the following: |
| NUTR 211 | Scientific Principles of Foods |
| NUTR 300/FSTC 300 | Religious and Ethnic Foods |
| NUTR 405 | Nutritional Treatment of Disease |
| NUTR 410/FSTC 410 | Nutritional Pharmacometrics of Food Compounds |
| NUTR 440/FSTC 440 | Therapeutic Microbiology: Probiotics and Related Strategies |
| NUTR 450 | Nutrition and Metabolism of Minerals |
| NUTR 469/FSTC 469 | Experimental Nutrition and Food Science Laboratory |
| NUTR 471/FSTC 471 | Critical Evaluation of Nutrition and Food Science Literature: Evidence Based Reviews |
The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. Selection must be from courses on the approved list. Selection can be courses that also satisfy the requirement for social and behavioral sciences; creative arts; language, philosophy and culture; or electives. For Core Curriculum requirements visit http://core.tamu.edu

The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. Selection must be from courses on the approved list. Selection can be courses that also satisfy the requirement for social and behavioral sciences; creative arts; language, philosophy and culture; or electives. For Core Curriculum requirements visit http://core.tamu.edu

Students interested in teacher certification must also complete the 18 credit hour STEM (Science, Technology, Engineering, Mathematics) Minor. Substitutions must be approved by the Department of Teaching, Learning and Culture advisors.

Teacher certification in **Biology/Life Science**

- STEM minor
- Technical electives: one Botany course (BIOL 328); one Ecology course (WFSC 402 or BIOL 357).

Teacher certification in **Science**

- STEM minor
- Technical electives: PHYS 201 and PHYS 202; one Earth Science course GEOL 101 or GEOL 308 and Ecology course WFSC 420, WFSC 409 or BIOL 357.

Teacher certification in **Chemistry**

- STEM minor
- No additional courses required

**STEM Minor**

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Credit</th>
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</thead>
<tbody>
<tr>
<td>TEED 302</td>
<td>Teaching/Learning Processes: Psychological Perspectives on Education</td>
<td>3</td>
</tr>
<tr>
<td>or INST 210</td>
<td>or Understanding Special Populations</td>
<td></td>
</tr>
<tr>
<td>TEFB 322</td>
<td>Teaching and Schooling in Modern Society</td>
<td>3</td>
</tr>
<tr>
<td>or TEFB 323</td>
<td>or Teaching Skills I</td>
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<tr>
<td>TEFB 324</td>
<td>Teaching Skills II</td>
<td>3</td>
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<tr>
<td>RDNG 372</td>
<td>Reading and Writing across the Middle Grades Curriculum</td>
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<tr>
<td>or RDNG 465</td>
<td>or Reading in the Middle and Secondary Grades</td>
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<tr>
<td>TEFB 406</td>
<td>Science in the Middle and Secondary School</td>
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<tr>
<td>or TEFB 407</td>
<td>or Mathematics in the Middle and Senior School</td>
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</table>

A total of 120 hours is required for graduation; 36 hours of 300/400 level courses are required to meet the Texas A&M University residency requirement.

Students interested in teacher certification must also complete the 18 credit hour STEM (Science, Technology, Engineering, Mathematics) Minor. Substitutions must be approved by the Department of Teaching, Learning and Culture advisors.

**Teacher certification in Biology/Life Science**

- STEM minor
- Technical electives: one Botany course (BIOL 328); one Ecology course (WFSC 402 or BIOL 357).

**Teacher certification in Science**

- STEM minor
- Technical electives: PHYS 201 and PHYS 202; one Earth Science course GEOL 101 or GEOL 308 and Ecology course WFSC 420, WFSC 409 or BIOL 357.

**Teacher certification in Chemistry**

- STEM minor
- No additional courses required

**Molecular and Experimental Track**

The Molecular and Experimental Track emphasizes a fundamental background in the biological and physical sciences that relate to human health and nutrition. This option offers students the opportunity to develop analytical and critical thinking skills through undergraduate research with department faculty, independent study and study abroad programs, and a science-based curricula that is essential for graduate studies and pre-professional schools. The goal of this track is to enable students to seek employment in specialized science-based fields in the biological or medical sciences, to pursue graduate degrees beyond the baccalaureate or to enter professional schools of medicine, veterinary medicine, dentistry, pharmacy or similar disciplines. See academic advisor for information on application procedures, GPR requirements, specific course listings and eligibility requirements.

**Program Requirements**

**First Year**

<table>
<thead>
<tr>
<th>Semester Credit Hours</th>
<th>BIOL 111</th>
<th>CHEM 101</th>
<th>CHEM 111</th>
</tr>
</thead>
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</tr>
<tr>
<td>4</td>
<td></td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Course</td>
<td>Description</td>
<td>Semester Credit Hours</td>
<td></td>
</tr>
<tr>
<td>--------</td>
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<td></td>
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<tr>
<td>ENGL 103 or ENGL 104</td>
<td>Introduction to Rhetoric and Composition or Composition and Rhetoric</td>
<td>3</td>
<td></td>
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<tr>
<td>MATH 141 or MATH 151</td>
<td>Business Mathematics I or Engineering Mathematics I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>NUTR 210/FSTC 210</td>
<td>Horizons in Nutrition and Food Science</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

| Term Semester Credit Hours | 16 |

| Spring | | |
| BIOL 112 | Introductory Biology II | 4 |
| CHEM 102 | Fundamentals of Chemistry II | 3 |
| CHEM 112 | Fundamentals of Chemistry Laboratory II | 1 |
| MATH 142 or MATH 152 | Business Mathematics II or Engineering Mathematics II | 3 |
| American history elective (p. 23) | 1 |
| Free elective | 1 |

| Second Year | | |
| Fall | | |
| CHEM 227 | Organic Chemistry I | 3 |
| CHEM 237 | Organic Chemistry Laboratory | 1 |
| ENGL 210 | Technical and Business Writing | 3 |
| NUTR 203 | Scientific Principles of Human Nutrition | 3 |
| PHYS 201 | College Physics | 4 |
| American history elective (p. 23) | 1 |

| Term Semester Credit Hours | 17 |

| Spring | | |
| CHEM 228 | Organic Chemistry II | 3 |
| CHEM 238 | Organic Chemistry Laboratory | 1 |
| POLS 206 | American National Government | 3 |
| Creative arts elective (p. 22) | 1 |
| Social and behavioral science elective (p. 23) | 1 |
| Select one of the following: | 3 |
| PHYS 202 | College Physics | |
| BIOL 413 or BIOL 414 | Cell Biology or Developmental Biology | |
| VTPP 425 | Pharmacology | |
| COMM 203 | Public Speaking | |
| COMM 315 or COMM 325 | Interpersonal Communication or Persuasion | |
| PSYC 306 | Abnormal Psychology | |
| PSYC 307 | Developmental Psychology | |
| HLTH 334/ WGST 334 | Women's Health | |
| HLTH 354 | Medical Terminology for the Health Professions | |

| Term Semester Credit Hours | 16 |

| Fall | | |
| BIOL 319 or VIBS 305 | Integrated Human Anatomy and Physiology I | 4 |
| NUTR 301 | Nutrition Through Life | 3 |
| POLS 207 | State and Local Government | 3 |
| Language, philosophy and culture elective (p. 21) | 1 |
| Free elective | 1 |

| Term Semester Credit Hours | 14 |

| Spring | | |
| BIOL 320 or VTPP 423 | Integrated Human Anatomy and Physiology I or Biomedical Physiology I | 4 |
| CHEM 316 | Quantitative Analysis | 2 |
| CHEM 318 | Quantitative Analysis Laboratory | 1 |
| GENE 301 | Comprehensive Genetics | 3 |
| GENE 312 | Comprehensive Genetics Laboratory | 1 |
| STAT 302 | Statistical Methods | 3 |

| Fourth Year | | |
| Fall | | |
| BICH 410 | Comprehensive Biochemistry I | 3 |
| NUTR 440/FSTC 440 | Therapeutic Microbiology: Probiotics and Related Strategies | 3 |
| NUTR 469/FSTC 369 | Experimental Nutrition and Food Science Laboratory | 4 |
| Select one of the following: | 3 |
| NUTR 405 | Nutritional Treatment of Disease | |
| NUTR 410/FSTC 410 | Nutritional Pharmacometrics of Food Compounds | |
| NUTR 471/FSTC 471 | Critical Evaluation of Nutrition and Food Science Literature: Evidence Based Reviews | |
| NUTR 485 | Directed Studies | |
| NUTR 489 | Special Topics in... | |
| NUTR 491 | Research | 2 |

| Term Semester Credit Hours | 15 |

| Spring | | |
| BICH 411 | Comprehensive Biochemistry II | 3 |
| BICH 431/GENE 431 | Molecular Genetics | 3 |
| NUTR 470 | Nutrition and Physiological Chemistry | 3 |
| NUTR 481 | Seminar | 1 |
| Select one of the following: | 3 |
| NUTR 405 | Nutritional Treatment of Disease | |
| NUTR 410/FSTC 410 | Nutritional Pharmacometrics of Food Compounds | |
| NUTR 471/FSTC 471 | Critical Evaluation of Nutrition and Food Science Literature: Evidence Based Reviews | |
| NUTR 485 | Directed Studies | |
| NUTR 489 | Special Topics in... | |
| NUTR 491 | Research | |

| Term Semester Credit Hours | 13 |

| Total Semester Credit Hours | 120 |
The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. Selection must be from courses on the approved list. Selection can be courses that also satisfy the requirement for social and behavioral sciences; creative arts; language, philosophy and culture; or electives. For Core Curriculum requirements visit http://core.tamu.edu

A total of 120 hours is required for graduation; 36 hours of 300/400 level courses are required to meet the Texas A&M University residency requirement.

Department of Plant Pathology and Microbiology

The Department of Plant Pathology and Microbiology...add text here.

Faculty

Appel, David N, Professor & Extension Specialist
Plant Pathology & Microbiology
PhD, Virginia Tech, 1980

Dickman, Martin B, Professor
Plant Pathology & Microbiology
PhD, University of Hawaii, 1986

Ebbole, Daniel J, Professor
Plant Pathology & Microbiology
PhD, Purdue University, 1988

Gonzalez, Carlos F, Professor
Plant Pathology & Microbiology
PhD, University of Nebraska, 1978

Gross, Dennis C, Professor
Plant Pathology & Microbiology
PhD, University of California, Davis, 1976

Jo, Young-Ki, Associate Professor & Extension Specialist
Plant Pathology & Microbiology
PhD, Ohio State University, 2005

Kenerley, Charles M, Professor
Plant Pathology & Microbiology
PhD, North Carolina State University, 1983

Kolomiets, Mikhail V, Professor
Plant Pathology & Microbiology
PhD, Iowa State University, 1998

Magill, Clint W, Professor
Plant Pathology & Microbiology
PhD, Cornell University, 1969

Pierson, Leland S, Professor
Plant Pathology & Microbiology
PhD, Washington State University, 1986

Scholtthof, Herman B, Professor
Plant Pathology & Microbiology
PhD, University of Kentucky, 1990

Scholtthof, Karenbeth G, Professor
Plant Pathology & Microbiology
PhD, University of Kentucky, 1989

Shan, Libo, Associate Professor
Plant Pathology & Microbiology
PhD, Kansas State University, 2003

Shaw, Brian D, Associate Professor
Plant Pathology & Microbiology
PhD, Cornell University, 2000

Shim, Won-Bo, Professor
Plant Pathology & Microbiology
PhD, Purdue University, 2000

Stoddard, Kati I., Instructional Assistant Professor
Plant Pathology & Microbiology
PhD, University of North Texas, 2013

Wilkinson, Heather H, Professor
Plant Pathology & Microbiology
PhD, Binghamton University, 1996

Yuan, Shuhua, Associate Professor
Plant Pathology & Microbiology
PhD, University of Tennessee, 2007

Majors

• Bachelor of Science in Bioenvironmental Sciences (p. 165)
• Bachelor of Science in Environmental Studies (p. 166)
• Bachelor of Science in University Studies, Environmental Business Option (p. 167)

Minors

• Bioenvironmental Sciences Minor (p. 169)

Bioenvironmental Sciences - BS

Major breakthroughs are taking place locally, regionally and globally concerning environmental awareness. Environmental hazards take many forms, including microbial threats, toxic wastes and the indirect impact of man’s activities on a fragile ecosystem. As a result, there is a growing recognition that the solutions to environmental problems require innovative multi-disciplinary perspectives and technologically-intensive approaches. The Bioenvironmental Sciences curriculum (BESC) was designed in consultation with numerous industry representatives in order to comply with the most current thinking on the talents needed for tomorrow’s environmental fields. Students will be prepared for a breadth of career choices in the environmental sciences. These choices include such areas as research and development, environmental consulting, remediation of wastes, site assessment and environmental sampling, and environmental law. Graduates from BESC find employment in federal, state and municipal environmental agencies; in industries concerned with the generation and clean-up of hazardous wastes; with environmental advocacy and educational groups. In addition, the strong science base in BESC prepares students for professional and graduate schools in a variety of disciplines.

The curriculum described combines a foundation of required courses of technical and free electives to allow the student the maximum flexibility to design a personalized course of study. Students are advised to
focus on an area of emphasis with those electives that come from such categories as conservation/ecology, policy/ethics/regulations, the physical environment, engineering, plant studies, genetics/biotechnology and general environmental. The Department of Plant Pathology and Microbiology also supports the extracurricular activities needed to support a successful environmental professional.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BESC 201</td>
<td>Introduction to Bioenvironmental Sciences</td>
<td>3</td>
</tr>
<tr>
<td>BESC 481</td>
<td>Seminar</td>
<td>1</td>
</tr>
<tr>
<td>BESC 484</td>
<td>Field Experience</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 101</td>
<td>Botany</td>
<td>8</td>
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<tr>
<td>&amp; BIOL 107</td>
<td>and Zoology</td>
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<tr>
<td>or BIOL 111</td>
<td>or Introductory Biology I and Introductory Biology II</td>
<td></td>
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<tr>
<td>&amp; BIOL 112</td>
<td>and Organic Chemistry I</td>
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<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
<td>4</td>
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<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
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<td>CHEM 102</td>
<td>Fundamentals of Chemistry II</td>
<td>4</td>
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<td>&amp; CHEM 112</td>
<td>and Fundamentals of Chemistry Laboratory II</td>
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<tr>
<td>CHEM 222</td>
<td>Elements of Organic and Biological Chemistry</td>
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<td>&amp; CHEM 242</td>
<td>and Elementary Organic Chemistry Laboratory</td>
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<td>or CHEM 227</td>
<td>or Organic Chemistry I and Organic Chemistry</td>
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<tr>
<td>&amp; CHEM 237</td>
<td>Laboratory</td>
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<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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<tr>
<td>GENE 310</td>
<td>Principles of Heredity</td>
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<tr>
<td>or GENE 315</td>
<td>or Genetics of Plants</td>
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<tr>
<td>PLPA 301</td>
<td>Plant Pathology</td>
<td>4</td>
</tr>
<tr>
<td>&amp; PLPA 303</td>
<td>and Plant Pathology Laboratory</td>
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<tr>
<td>RENR 205</td>
<td>Fundamentals of Ecology</td>
<td>4</td>
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<tr>
<td>&amp; RENR 215</td>
<td>and Fundamentals of Ecology Laboratory</td>
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<tr>
<td>SCSC 301</td>
<td>Soil Science</td>
<td>4</td>
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<tr>
<td>STAT 302</td>
<td>Statistical Methods</td>
<td>3</td>
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<tr>
<td>American history elective <em>(p. 23)</em> 1</td>
<td>6</td>
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<tr>
<td>Bioenvironmental group electives</td>
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<td>Select from the following:</td>
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<tr>
<td>BESC 204</td>
<td>Molds and Mushrooms: The Impact of Fungi on</td>
<td></td>
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<tr>
<td></td>
<td>Society and the Environment</td>
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<td>BESC 314</td>
<td>Pathogens, the Environment and Society</td>
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<td>BESC 320</td>
<td>Water and the Bioenvironmental Sciences</td>
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<td>BESC 357</td>
<td>Biotechnology for Biofuels and Bioproducts</td>
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<td>BESC 367</td>
<td>U.S. Environmental Regulations</td>
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<td>BESC 401</td>
<td>Bioenvironmental Microbiology</td>
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<td>BESC 402</td>
<td>Microbial Processes in Bioremediation</td>
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<td>BESC 403</td>
<td>Sampling and Environmental Monitoring</td>
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<tr>
<td>BESC 489</td>
<td>Special Topics in...</td>
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<td>SCSC 405</td>
<td>Soil and Water Microbiology</td>
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<td>Other courses approved by advisor</td>
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<tr>
<td>Communication elective <em>(p. 20)</em></td>
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<tr>
<td>Creative arts electives <em>(p. 22)</em> 1</td>
<td>3</td>
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<tr>
<td>Government/Political science elective <em>(p. 23)</em></td>
<td>6</td>
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<tr>
<td>Language, philosophy and culture elective <em>(p. 21)</em> 1</td>
<td>3</td>
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<tr>
<td>Mathematics elective <em>(p. 20)</em></td>
<td>6</td>
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<tr>
<td>Social and behavioral science elective <em>(p. 23)</em> 1</td>
<td>3</td>
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</tr>
</tbody>
</table>

**Technical electives** 2  15
**Free electives** 9  
**Total Semester Credit Hours** 120

1  The Graduation requirements include a requirement for six hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement. See academic advisor.

2  Courses may be selected from categories designed to reflect the professional aspirations of the student. Exact number of technical electives will depend on choice selections from other categories to achieve a minimum 120 hours.

**Environmental Studies - BS**

The BS degree in Environmental Studies in the College of Agriculture and Life Sciences provides students with the opportunity to learn about the major societal forces that influence environmental issues. These include political agreement supporting legal and regulatory requirements, economics and the marketplace, environmental values, and technology. Students gain technical background blended with a solid foundation in economics, political issues, environmental law, ethics, and communications. Technology and the environment are well supported in existing curricula and contribute to the multidisciplinary nature of the Environmental Studies degree. Technical courses focus on biological sciences, natural resources, and assessment of the environment and come from the Agricultural Economics; Bioenvironmental Sciences; Entomology; Forest Science; Rangeland Ecology and Management; Recreation, Park and Tourism Sciences; Soil and Crop Sciences; and Wildlife and Fisheries Sciences. It is the fusion of these courses with those from the Liberal Arts that make this a truly unique curriculum. This degree is housed within the Department of Plant Pathology and Microbiology.

**Program Requirements**

**Required Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>BESC 201</td>
<td>Introduction to Bioenvironmental Sciences</td>
<td>3</td>
</tr>
<tr>
<td>BESC 367</td>
<td>U.S. Environmental Regulations</td>
<td>3</td>
</tr>
<tr>
<td>BESC 481</td>
<td>Seminar</td>
<td>1</td>
</tr>
<tr>
<td>BESC 484</td>
<td>Field Experience</td>
<td>3</td>
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<tr>
<td>BIOL 101</td>
<td>Botany</td>
<td>4</td>
</tr>
<tr>
<td>or BIOL 111</td>
<td>or Introductory Biology I</td>
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<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
<td>4</td>
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<tr>
<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
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<td>ESSM 309</td>
<td>Forest Ecology</td>
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<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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<tr>
<td>Select one of the following:</td>
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<tr>
<td>ESSM 351</td>
<td>Geographic Information Systems for Resource</td>
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<tr>
<td></td>
<td>Management</td>
<td></td>
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<tr>
<td>RENR 405</td>
<td>GIS for Environmental Problem Solving</td>
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<tr>
<td>RENR 470</td>
<td>Environmental Impact Assessment</td>
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<tr>
<td>GEOG 201</td>
<td>Introduction to Human Geography</td>
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<tr>
<td>GEOG 203</td>
<td>Planet Earth</td>
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<tr>
<td>GEOG 213</td>
<td>Planet Earth Lab</td>
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<td>GEOG 304</td>
<td>Economic Geography</td>
<td>3</td>
</tr>
<tr>
<td>RENR 205</td>
<td>Fundamentals of Ecology</td>
<td>3</td>
</tr>
<tr>
<td>RENR 375</td>
<td>Conservation of Natural Resources</td>
<td>3</td>
</tr>
</tbody>
</table>
SCSC 301  Soil Science  4
STAT 303  Statistical Methods  3
WFSC 301  Wildlife and the Changing Environment  3
American history elective (p. 23)  6
Communication elective (p. 20)  3
Creative arts elective (p. 22)  3
Environmental policy elective  15

Select five of the following in consultation with academic advisor:

AGEC 344  Food and Agricultural Law
AGEC 350  Environmental and Natural Resource Economics
AGEC 429  Agricultural Policy
AGSM 355  Energy and Conversion Systems
BESC 314  Pathogens, the Environment and Society
BESC 357  Biotechnology for Biofuels and Bioproducts
ECON 202  Principles of Economics
ECON 203  Principles of Economics
ECON 323  Microeconomic Theory
ECON 412  Public Finance
ECON 435  Economics of Resource Scarcity
ENTO 210  Global Public Health Entomology
ENTO 315  Biototechnology and Society
ENTO 431/ FIVS 431  The Science of Forensic Entomology
FIVS 431
GEOG 401  Political Geography
GEOG 406  Geographic Perspectives on Contemporary Urban Issues
PHIL 205  Technology and Human Values
PHIL 314  Environmental Ethics
URPN 202  Building Better Cities
URPN 460  Sustainable Communities
POLS 229  Introduction to Comparative Politics
POLS 231  Introduction to World Politics
POLS 306  Contemporary Political Problems and Issues
POLS 340  Introduction to Public Administration
POLS 342  Politics and Bureaucracy
POLS 347  Politics of Energy and the Environment
POLS 440  Public Policies and Policymaking
POLS 461  Jurisprudence
SOCI 312  Population and Society
SOCI 328  Environmental Sociology
WFSC 303  Fish and Wildlife Laws and Administration

Government/Political science elective (p. 23)  6
Language, philosophy and culture elective (p. 21)  3
Mathematics elective (p. 20)  6

Natural resources elective  12

Select four of the following in consultation with academic advisor:

AGSM 301  Systems Analysis in Agriculture
AGSM 337  Technology for Environmental and Natural Resource Engineering
BESC 204  Molds and Mushrooms: The Impact of Fungi on Society and the Environment
BESC 320  Water and the Bioenvironmental Sciences
BESC 401  Bioenvironmental Microbiology
BESC 403  Sampling and Environmental Monitoring
ENTO 201  General Entomology
ENTO 313  Biology of Insects
ENTO 320  Honey Bee Biology
ENTO 403  Urban Entomology
ENTO 424  Insect Ecology
FRSC 421  Urban Forestry
HORT 301  Garden Science
POSC 427  Animal Waste Management
REN R 410  Ecosystem Management
RPTS 316  Recreational Management of Wildlands
RPTS 426  Tourism Impacts
RPTS 460/ RENR 460  Nature, Values, and Protected Areas
WFSC 304  Wildlife and Fisheries Conservation
WFSC 403  Animal Ecology
WFSC 405  Urban Wildlife and Fisheries
WFSC 418  Ecology of the Coastal Zone
WFSC 420  Ecology and Society

Social and behavioral science elective (p. 23)  3
Free electives  10

Total Semester Credit Hours  120

1  The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement. See academic advisor.

A minimum of 120 semester hours will be required for a BS degree.

University Studies - BS, Environmental Business Concentration

A University Studies Degree differs from a traditional “major” in that it consists of a concentration of 21-24 hours and two minors of 15-18 hours each. The University Studies Degree format was created to provide students the flexibility to combine areas of study that are of special interest. Under the guidelines of the University Studies degree requirements, the student’s diploma will list “University Studies” in the place where the major is currently listed. The student’s area of concentration (Environmental Business) and the two minors (Rangeland Ecology & Management AND Business) will be indicated on the student’s transcript.

This new degree option features a blending of environmental science coursework and business coursework in a truly unique combination unlike any other degree at Texas A&M University. The Environmental Business concentration draws heavily from the established Bioenvironmental Sciences degree already offered at Texas A&M, but this concentration is significantly different in that it lacks the larger number of life science courses that serve as a necessary foundation in any environmental
science degree. The focus on environmental coursework (through the BESC and ESSM courses) coupled with core business coursework allows this University Studies concentration to provide a very well-rounded and marketable degree in a variety of arenas.

This interdisciplinary degree plan provides a highly-marketable focus from an already fast-rising, multi-faceted discipline. The coursework retains the “customizable” nature of the university studies degree within the concentration itself, allowing students a truly one-of-a-kind opportunity for their bachelor’s degree. The Environmental Business concentration provides a solid foundation of Bioenvironmental Sciences coursework that, when paired with the Rangeland Ecology & Management minor and the Business minor, provides students with a versatile, sound degree that is uniquely positioned in the job market and combines a general overview of both environmental issues/policies and business administration principals/content.

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BESC 201</td>
<td>Introduction to Bioenvironmental Sciences</td>
<td>3</td>
</tr>
<tr>
<td>BESC 367</td>
<td>U.S. Environmental Regulations</td>
<td>3</td>
</tr>
<tr>
<td>BESC 481</td>
<td>Seminar</td>
<td>1</td>
</tr>
<tr>
<td>BESC 484</td>
<td>Field Experience</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 101</td>
<td>Botany</td>
<td>4</td>
</tr>
<tr>
<td>or BIOL 111 or Introductory Biology I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 101 &amp; CHEM 111</td>
<td>Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory I</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
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<tr>
<td>BESC concentration electives</td>
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<tr>
<td>Select three of the following:</td>
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<tr>
<td>BESC 204</td>
<td>Molds and Mushrooms: The Impact of Fungi on Society and the Environment</td>
<td></td>
</tr>
<tr>
<td>BESC 314</td>
<td>Pathogens, the Environment and Society</td>
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<tr>
<td>BESC 320</td>
<td>Water and the Bioenvironmental Sciences</td>
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</tr>
<tr>
<td>BESC 357</td>
<td>Biotechnology for Biofuels and Bioproducts</td>
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<tr>
<td>BESC 489</td>
<td>Special Topics in...</td>
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<tr>
<td>PLPA 301 &amp; PLPA 303</td>
<td>Plant Pathology and Plant Pathology Laboratory</td>
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<tr>
<td>Communication (p. 20)</td>
<td></td>
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<tr>
<td>Creative arts (p. 22)</td>
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<tr>
<td>Language, philosophy and culture (p. 21)</td>
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<tr>
<td>Mathematics (p. 20)</td>
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<td>6</td>
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<tr>
<td>Social and behavioral science (p. 23)</td>
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<td>3</td>
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<tr>
<td>American history (p. 23)</td>
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<td>6</td>
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<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
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<td>POLS 207</td>
<td>State and Local Government</td>
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<td>Free electives</td>
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<tr>
<td>Business Minor</td>
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<tr>
<td>Rangeland Ecology and Management Minor</td>
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<td>16</td>
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</tbody>
</table>

Total Semester Credit Hours 120

1 The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement. See academic advisor.

Business Minor

The minor in business consists of six specific courses chosen to develop a foundational knowledge in the basic aspects of business, including accounting, finance, management information systems, management, and marketing.

The courses listed below constitute the 18 hours required for a minor in business.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ACCT 209</td>
<td>Survey of Accounting Principles</td>
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</tr>
<tr>
<td>ISYS 209</td>
<td>Business Information Systems Concepts</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 209</td>
<td>Business, Government and Society</td>
<td>3</td>
</tr>
<tr>
<td>FINC 409</td>
<td>Survey of Finance Principles</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 309</td>
<td>Survey of Management</td>
<td>3</td>
</tr>
<tr>
<td>MKTG 409</td>
<td>Principles of Marketing</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 18

1 MGMT 212 cannot be used to meet this requirement.
2 Course must be taken in residence at Texas A&M. No transfer courses will be accepted.

Students must earn a grade of “C” or better in each course listed above to be awarded the business minor and receive transcript recognition.

Rangeland Ecology and Management Minor

Select one of the following: 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSM 302</td>
<td>Wildland Plants of North America</td>
<td></td>
</tr>
<tr>
<td>ESSM 303</td>
<td>Agrostology</td>
<td></td>
</tr>
<tr>
<td>ESSM 304</td>
<td>Rangeland Plant Taxonomy</td>
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</tr>
<tr>
<td>ESSM 314</td>
<td>Principles of Rangeland Management Around the World</td>
<td>3</td>
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</table>

Select 6 semester credit hours from the following: 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSM 301</td>
<td>Wildland Watershed Management</td>
<td></td>
</tr>
<tr>
<td>ESSM 316</td>
<td>Range Ecology</td>
<td></td>
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<tr>
<td>ESSM 317</td>
<td>Vegetation Management</td>
<td></td>
</tr>
<tr>
<td>ESSM 320</td>
<td>Ecosystem Restoration and Management</td>
<td></td>
</tr>
<tr>
<td>ESSM 416</td>
<td>Fire Ecology and Natural Resource Management</td>
<td></td>
</tr>
<tr>
<td>ESSM 420</td>
<td>Ecological Restoration of Wetland and Riparian Systems</td>
<td></td>
</tr>
<tr>
<td>ESSM 415</td>
<td>Range Analysis and Management Planning or RENR 410</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 16

Students must make a grade of "C" or better in all courses.
Bioenvironmental Sciences - Minor

The minor in Bioenvironmental Sciences is available to all students enrolled at Texas A&M University.

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BESC 201</td>
<td>Introduction to Bioenvironmental Sciences</td>
<td>3</td>
</tr>
<tr>
<td>PLPA 301</td>
<td>Plant Pathology</td>
<td>3</td>
</tr>
<tr>
<td>PLPA 303</td>
<td>Plant Pathology Laboratory</td>
<td>1</td>
</tr>
</tbody>
</table>

Select 9 hours from the following:

- BESC 204 Molds and Mushrooms: The Impact of Fungi on Society and the Environment
- BESC 314 Pathogens, the Environment and Society
- BESC 320 Water and the Bioenvironmental Sciences
- BESC 367 U.S. Environmental Regulations
- BESC 401 Bioenvironmental Microbiology
- BESC 402 Microbial Processes in Bioremediation
- BESC 403 Sampling and Environmental Monitoring
- BESC 484 Field Experience
- BESC 485 Directed Studies
- BESC 489 Special Topics in...
- BESC 491 Research

Total Semester Credit Hours: 16

Students must make a grade of "C" or better in all courses.

Department of Poultry Science

Growth of the poultry industry has created the need for scientific, technical and business knowledge in the various fields important to successful poultry production. In few fields of science is an understanding of the basic sciences, nutrition, genetics, physiology, diseases, biotechnology, processing and marketing more rewarding than in the modern, intensive methods of poultry and food production. Students are trained in the necessary background, analytical skills, problem solving and leadership for complex production units, hatcheries, integrated feed mills, processing plants and research laboratories. Rapid industry growth provides many career opportunities for graduates. Students are given two emphasis areas in which to specialize their education toward their selected career goals. The University Core Curriculum courses and the Poultry Science Core courses are required for both emphases. Students then complete a BS degree in either emphasis area by completing the respective emphasis area courses. All students are strongly encouraged to get early and frequent academic counseling which is readily available.

Faculty

- Alvarado, Christine Z, Associate Professor
  Poultry Science
  PhD, Texas A&M University, 2001

- Archer, Gregory S, Assistant Professor & Extension Specialist
  Poultry Science
  PhD, Texas A&M University, 2005

Athrey, Giridhar N, Assistant Professor
Poultry Science
PhD, University of Louisiana at Lafayette, 2009

Bailey, Christopher A, Professor
Poultry Science
PhD, Texas A&M University, 1982

Berghman, Luc R, Associate Professor
Poultry Science
PhD, University of Leuven, 1988

Caldwell, David J, Professor
Poultry Science
PhD, Texas A&M University, 1997

Carey, John B, Professor
Poultry Science
PhD, Kansas State University, 1982

Coufal, Craig D, Associate Professor & Extension Specialist
Poultry Science
PhD, Texas A&M University, 2005

Duong, Tri, Associate Professor
Poultry Science
PhD, North Carolina State University, 2008

Lee, Jason T, Associate Professor
Poultry Science
PhD, Texas A&M University, 2006

McElroy, Audrey P, Professor & Extension Specialist
Poultry Science
PhD, Texas A&M University, 1998

Pillai, Suresh D, Professor
Poultry Science
PhD, University of Arizona, 1989

Sams, Alan R, Professor
Poultry Science
PhD, University of Florida, 1987

Walzem, Rosemary L, Professor
Poultry Science
PhD, University of California, Davis, 1987

Majors

- Bachelor of Science in Poultry Science, Industry Emphasis (p. 169)
- Bachelor of Science in Poultry Science, Technical Emphasis (p. 170)

Minors

- Poultry Science Minor (p. 171)

Poultry Science - BS, Industry Emphasis

Growth of the poultry industry has created the need for scientific, technical and business knowledge in the various fields important to successful poultry production. In few fields of science is an understanding of the basic sciences, nutrition, genetics, physiology, diseases, biotechnology, processing and marketing more rewarding than in the modern, intensive
methods of poultry and food production. Students are trained in the necessary background, analytical skills, problem solving and leadership for complex production units, hatcheries, integrated feed mills, processing plants and research laboratories. Rapid industry growth provides many career opportunities for graduates. Students are given two emphasis areas in which to specialize their education toward their selected career goals. The University Core Curriculum courses and the Poultry Science Core courses are required for both emphases. Students then complete a BS degree in either emphasis area by completing the respective emphasis area courses. All students are strongly encouraged to get early and frequent academic counseling which is readily available.

Students completing a BS degree in the industry emphasis find employment with the poultry and food industries in positions such as corporate management, quality assurance, sales or technical support in live production, processing or marketing. Students in this emphasis also get positions with pharmaceutical and equipment companies, with industry trade publications and in various university and public service positions.

Students completing a BS degree in the technical emphasis are prepared for advanced study in biochemistry, nutrition, physiology, molecular genetics, reproduction, processing technology, microbiology or environmental science and for eventual professional employment in research, teaching or public service. This curriculum can be easily tailored to meet the veterinary medicine preprofessional requirements.

**Program Requirements**

**Poultry Science Core Courses**

- **POSC 302** Avian Science Laboratory 1
- **POSC 308** Avian Anatomy and Physiology 3
- **POSC 309** Poultry Meat Production 4
- **POSC 319** Breeder and Hatchery Management 3
- **POSC 326** Commercial Egg Industry 3
- **POSC 381** Investigation of Professional Development in Poultry Science 2
- **POSC 406/FSTC 406** Poultry Further Processing 4
- **POSC 411** Poultry Nutrition 3
- **POSC 412** Poultry Feed Formulation 1
- **POSC 414** Avian Genetics and Breeding 3
- **POSC 425** Environmental Physiology 3
- **POSC 427** Animal Waste Management 3
- **POSC 429** Advanced Food Bacteriology 4
- **POSC 481** Poultry Science Systems 2

**Support Courses**

- **ACCT 209** Survey of Accounting Principles 3
- or **AGEC 314** or Marketing Agricultural and Food Products
- **CHEM 222** Elements of Organic and Biological Chemistry 3
- **DASC 326/FSTC 326** Food Bacteriology 3
- **STAT 301** Introduction to Biometry 3
- **VTPB 334** Poultry Diseases 4
- Select one of the following: 3
  - **ACCT 210** Survey of Managerial and Cost Accounting Principles
  - **ACCT 229** Introductory Accounting
  - **AGEC 340** Agribusiness Management

**University Core Curriculum**

- **AGEC 105** Introduction to Agricultural Economics 3
- **Biol 111** Introductory Biology I 4
- or **Biol 107** or Zoology
- **Chem 101** Fundamentals of Chemistry I 4
- **Chem 111** and Fundamentals of Chemistry Laboratory I
- **POSC 201** General Avian Science 3
- American history elective (p. 23) 2
- Communication elective (p. 20) 6
- Creative arts elective (p. 22) 2 3
- Government/Political science elective (p. 23) 6
- Language, philosophy and culture elective (p. 21) 2 3
- **Math 142** Business Mathematics II 3
- **Phil 240** Introduction to Logic 3

**Electives** 18

**Total Semester Credit Hours** 120

1 To be utilized by students to enhance the science and/or business aspects of their undergraduate program. Also, students should have computer literacy (having completed one year of computer science in high school) or they must use 3 hours for a computer class (REN 201 or ISYS 209).

2 Six hours must be selected from the International Cultural Diversity section of the Graduation requirements.

**Poultry Science - BS, Technical Emphasis**

Growth of the poultry industry has created the need for scientific, technical and business knowledge in the various fields important to successful poultry production. In few fields of science is an understanding of the basic sciences, nutrition, genetics, physiology, diseases, biotechnology, processing and marketing more rewarding than in the modern, intensive methods of poultry and food production. Students are trained in the necessary background, analytical skills, problem solving and leadership for complex production units, hatcheries, integrated feed mills, processing plants and research laboratories. Rapid industry growth provides many career opportunities for graduates. Students are given two emphasis areas in which to specialize their education toward their selected career goals. The University Core Curriculum courses and the Poultry Science Core courses are required for both emphases. Students then complete a BS degree in either emphasis area by completing the respective emphasis area courses. All students are strongly encouraged to get early and frequent academic counseling which is readily available.

Students completing a BS degree in the industry emphasis find employment with the poultry and food industries in positions such as corporate management, quality assurance, sales or technical support in live production, processing or marketing. Students in this emphasis also
get positions with pharmaceutical and equipment companies, with industry trade publications and in various university and public service positions.

Students completing a BS degree in the technical emphasis are prepared for advanced study in biochemistry, nutrition, physiology, molecular genetics, reproduction, processing technology, microbiology or environmental science and for eventual professional employment in research, teaching or public service. This curriculum can be easily tailored to meet the veterinary medicine preprofessional requirements.

**Program Requirements**

**Poultry Science Core Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSC 302</td>
<td>Avian Science Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>POSC 308</td>
<td>Avian Anatomy and Physiology</td>
<td>3</td>
</tr>
<tr>
<td>POSC 309</td>
<td>Poultry Meat Production</td>
<td>4</td>
</tr>
<tr>
<td>POSC 319</td>
<td>Breeder and Hatchery Management</td>
<td>3</td>
</tr>
<tr>
<td>POSC 326</td>
<td>Commercial Egg Industry</td>
<td>3</td>
</tr>
<tr>
<td>POSC 381</td>
<td>Investigation of Professional Development in Poultry Science</td>
<td>2</td>
</tr>
</tbody>
</table>

**POSC 406/FSTC 406** Poultry Further Processing 4

**POSC 411** Poultry Nutrition 3

**POSC 412** Poultry Feed Formulation 1

**POSC 425** Environmental Physiology 3

**POSC 427** Animal Waste Management 3

**POSC 429** Advanced Food Bacteriology 4

**POSC 481** Poultry Science Systems 2

**Support Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BICH 303</td>
<td>Elements of Biological Chemistry</td>
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<tr>
<td>BIOL 351</td>
<td>Fundamentals of Microbiology 1</td>
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<tr>
<td>or VTPB 405</td>
<td>Biomedical Microbiology</td>
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<tr>
<td>CHEM 102</td>
<td>Fundamentals of Chemistry II</td>
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<td>&amp; CHEM 112</td>
<td>and Fundamentals of Chemistry Laboratory II</td>
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<tr>
<td>CHEM 227</td>
<td>Organic Chemistry I</td>
<td>4</td>
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<tr>
<td>&amp; CHEM 237</td>
<td>and Organic Chemistry Laboratory</td>
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<tr>
<td>GENE 301</td>
<td>Comprehensive Genetics</td>
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<tr>
<td>&amp; GENE 312</td>
<td>and Comprehensive Genetics Laboratory</td>
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</tr>
<tr>
<td>STAT 301</td>
<td>Introduction to Biometry</td>
<td>3</td>
</tr>
<tr>
<td>VTPB 334</td>
<td>Poultry Diseases</td>
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</table>

**Electives** 1

**University Core Curriculum**

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
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<td>or BIOL 107</td>
<td>Zoology</td>
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<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
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<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
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</tr>
<tr>
<td>POSC 201</td>
<td>General Avian Science</td>
<td>3</td>
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</tbody>
</table>

**American history elective (p. 23) 2** 6

**Communication elective (p. 20)** 6

**Creative arts elective (p. 22) 2** 3

**Government/Political science elective (p. 23)** 6

**Language, philosophy and culture elective (p. 21) 2** 3

**MATH 142** Business Mathematics II 3

**PHIL 240** Introduction to Logic 3

**Total Semester Credit Hours** 120

1. To be utilized by students to enhance the science and/or business aspects of their undergraduate program. Also, students should have computer literacy (having completed one year of computer science in high school) or they must use 3 hours for a computer class (RENR 201 or ISYS 209).

2. Six hours must be selected from the International Cultural Diversity section of the Graduation requirements.

**Poultry Science - Minor**

A Poultry Science Minor requires a minimum of sixteen credit hours of Poultry Science courses and the approval by the Department Head/Program Director/Dean of the major department.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>POSC 201</td>
<td>General Avian Science</td>
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<tr>
<td>POSC 309</td>
<td>Poultry Meat Production</td>
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Select three of the following: 9

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>POSC 308</td>
<td>Avian Anatomy and Physiology</td>
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</tr>
<tr>
<td>POSC 313</td>
<td>Game Birds and Ornamental Fowl</td>
<td></td>
</tr>
<tr>
<td>POSC 319</td>
<td>Breeder and Hatchery Management</td>
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</tr>
<tr>
<td>POSC 326</td>
<td>Commercial Egg Industry</td>
<td></td>
</tr>
<tr>
<td>POSC 333</td>
<td>Instincts and Behavior</td>
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</tr>
<tr>
<td>POSC 406/FSTC 406</td>
<td>Poultry Further Processing</td>
<td>4</td>
</tr>
<tr>
<td>POSC 414</td>
<td>Avian Genetics and Breeding</td>
<td></td>
</tr>
<tr>
<td>POSC 425</td>
<td>Environmental Physiology</td>
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<tr>
<td>POSC 427</td>
<td>Animal Waste Management</td>
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<tr>
<td>VTPB 334</td>
<td>Poultry Diseases</td>
<td></td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours** 16

Must make a grade of 'C' or better.

**Department of Recreation, Park and Tourism Sciences**

The undergraduate curriculum leading to a Bachelor of Science degree with a major in Recreation, Park and Tourism Sciences emphasizes problem-solving skills, development of an international perspective and the application of scientific principles to managerial problems. Students study both the social and life sciences to gain an understanding of how to manage and market organizations in the vast park, recreation and tourism industry. The curriculum provides the student with an introduction to the history and concepts of recreation, park and tourism sciences, followed by the knowledge and skills for both entry-level positions and for future professional growth in the field. In addition to core courses, students must fulfill requirements for at least one certificate, and may earn additional certificates. An education in recreation, park and tourism sciences prepares students to become leaders for the 21st century with the capacity to learn from life and throughout life.
Faculty
Crompton, John L, Distinguished Professor
Recreation, Park & Tourism Sc
PhD, Texas A&M University, 1977

Durko, Angela M, Lecturer
Recreation, Park & Tourism Sc
PhD, Texas A&M University, 2014

Enoh, Linda L, Lecturer
Recreation, Park & Tourism Sc
PhD, Texas A&M University, 2011

Gramann, James H, Professor
Recreation, Park & Tourism Sc
PhD, University of Illinois at Urbana-Champaign, 1980

Harrist, Christopher J, Assistant Professor & Extension Specialist
Recreation, Park & Tourism Sc
PhD, Texas A&M University, 2009

Heo, Jinmoo, Assistant Professor
Recreation, Park & Tourism Sc
PhD, Indiana University, 2007

Hodges, Louis, Associate Professor
Recreation, Park & Tourism Sc
PhD, Texas A&M University, 1971

Jacob, John S, Professor & Extension Specialist
Recreation, Park & Tourism Sc
PhD, Texas A&M University, 1992

Jamal, Tazim B, Associate Professor
Recreation, Park & Tourism Sc
PhD, University of Calgary, 1997

Kaiser, Ronald A, Professor
Recreation, Park & Tourism Sc
JD, Thomas M. Cooley Law School, 1977

Kelly, Brandy N, Assistant Professor
Recreation, Park & Tourism Sc
PhD, Texas A&M University, 2013

Kyle, Gerard T, Professor
Recreation, Park & Tourism Sc
PhD, Pennsylvania State University, 2001

Kyle, Kelly T, Lecturer
Recreation, Park & Tourism Sc
MS, Pennsylvania State University, 2000

Martz, Jill T, Executive Professor
Recreation, Park & Tourism Sc
PhD, University of Tennessee, 2004

Matarrita Cascante, David, Associate Professor
Recreation, Park & Tourism Sc
PhD, Pennsylvania State University, 2008

Outley, Corliss D, Associate Professor
Recreation, Park & Tourism Sc
PhD, Texas A&M University, 2000

Petrick, James F, Professor
Recreation, Park & Tourism Sc
PhD, Clemson University, 1999

Schuett, Michael A, Associate Professor
Recreation, Park & Tourism Sc
PhD, University of Illinois at Urbana-Champaign, 1991

Scott, David, Professor
Recreation, Park & Tourism Sc
PhD, Pennsylvania State University, 1990

Scott, Susan G, Lecturer
Recreation, Park & Tourism Sc
MS, Pennsylvania State University, 1987

Shafer, C S, Professor
Recreation, Park & Tourism Sc
PhD, Clemson University, 1993

Shafer, Debra M, Lecturer
Recreation, Park & Tourism Sc
MS, University of Utah, 1985

Stronza, Amanda L, Associate Professor
Recreation, Park & Tourism Sc
PhD, University of Florida, 2000

Thomas, John K, Lecturer
Recreation, Park & Tourism Sc
PhD, Texas A&M University, 1979

Walker, Jamie R, Assistant Professor & Extension Specialist
Recreation, Park & Tourism Sc
PhD, Texas A&M University, 2008

Woosnam, Kyle M, Associate Professor
Recreation, Park & Tourism Sc
PhD, Clemson University, 2008

Majors
- Bachelor of Science in Community Development (p. 173)
- Bachelor of Science in Recreation, Park and Tourism Sciences, Community Recreation and Park Administration Certificate (p. 174)
- Bachelor of Science in Recreation, Park and Tourism Sciences, Parks and Conservation Certificate (p. 175)
- Bachelor of Science in Recreation, Park and Tourism Sciences, Tourism Management Certificate (p. 176)
- Bachelor of Science in Recreation, Park and Tourism Sciences, Youth Development Certificate (p. 177)
- Bachelor of Science in Renewable Natural Resources (p. 142)

Minors
- Park and Natural Resource Management Minor (p. 178)
- Tourism Management Minor (p. 178)

Certificates
- Professional Event Manager Certificate (p. 179)
- Tourism and Hospitality Management Certificate (p. 179)
Community Development - BS

The Department of Recreation, Park and Tourism Sciences offers courses leading to a Bachelor of Science degree in Community Development. This major is an interdisciplinary program. The curriculum provides students with theoretical, statistical, decision-making and communication skills that they can effectively apply in federal and state governmental agencies, community planning firms, municipal departments, marketing firms, economic development organizations, non-profits and other professional settings. The program will enhance students’ abilities to: understand, collect and analyze different kinds of data; work with community leaders, groups and the public; identify and mobilize necessary resources for development processes; and assess outcomes and impacts of community change and development on local populations. Graduates with a Community Development major will be able to apply their knowledge and skills to issues including institutional development; human capacity building; economic development; youth development; poverty; welfare-to-work; water quality; land use planning; and other issues involving the mobilization of, and collaboration with, diverse community groups.

Students who select this major will participate in a common set of core courses in the Department of Recreation, Park and Tourism Sciences. These courses emphasize the importance of parks, recreation, tourism, and youth-oriented programs to community development processes and strategies. In addition, they will enroll in courses specifically required for the community development major. Finally, the program offers a variety of electives that cover a range of thematic areas which will allow students of this major to specialize in their preferred area of community development.

Program Requirements

Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPTS 304</td>
<td>Administration of Recreation Resource Agencies</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 308</td>
<td>Foundations of Community and Community Development</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 311</td>
<td>Planning and Implementation of Events and Programs</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 336</td>
<td>Research and Analysis in Recreation and Tourism</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 340</td>
<td>Recreation, Parks, Tourism and Diverse Populations</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 402</td>
<td>Park Planning and Design</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 403</td>
<td>Financing and Marketing Recreation, Park and Tourism Resources</td>
<td>4</td>
</tr>
<tr>
<td>RPTS 404/</td>
<td>Sociology of the Community</td>
<td>3</td>
</tr>
<tr>
<td>SOCi 404</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RPTS 408</td>
<td>Community Development and Supporting Institutions</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 481</td>
<td>Seminar</td>
<td>1</td>
</tr>
<tr>
<td>RPTS 484</td>
<td>Internship</td>
<td>6</td>
</tr>
</tbody>
</table>

Community and Urban Life

Select two courses from the following: 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEc 344</td>
<td>Food and Agricultural Law</td>
</tr>
<tr>
<td>ALED 441</td>
<td>Agricultural Extension Organization and Methods</td>
</tr>
<tr>
<td>GEOG 306</td>
<td>Introduction to Urban Geography</td>
</tr>
<tr>
<td>RPTS 370</td>
<td>Youth Development Organizations and Services</td>
</tr>
<tr>
<td>RPTS 460/</td>
<td>Nature, Values, and Protected Areas</td>
</tr>
<tr>
<td>RENR 460</td>
<td></td>
</tr>
<tr>
<td>URPN 361</td>
<td>Urban Issues</td>
</tr>
</tbody>
</table>

Leadership Development

Select one course from the following: 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALED 340</td>
<td>Survey of Leadership Theory</td>
</tr>
<tr>
<td>MGMT 309</td>
<td>Survey of Management</td>
</tr>
</tbody>
</table>

Required Technical Support

Technical Writing

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGCJ 404</td>
<td>Communicating Agricultural Information to the Public</td>
</tr>
<tr>
<td>or ENGL 210</td>
<td>or Technical and Business Writing</td>
</tr>
</tbody>
</table>

Economics

Select two courses from the following: 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEc 105</td>
<td>Introduction to Agricultural Economics</td>
</tr>
<tr>
<td>AGEc 422</td>
<td>Land Economics</td>
</tr>
<tr>
<td>ECON 202</td>
<td>Principles of Economics</td>
</tr>
<tr>
<td>ECON 203</td>
<td>Principles of Economics</td>
</tr>
</tbody>
</table>

Accounting and Finance

Select one course from the following: 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 209</td>
<td>Survey of Accounting Principles</td>
</tr>
<tr>
<td>ACCT 210</td>
<td>Survey of Managerial and Cost Accounting Principles</td>
</tr>
<tr>
<td>AGEc 330</td>
<td>Financial Management in Agriculture</td>
</tr>
<tr>
<td>AGEc 340</td>
<td>Agribusiness Management</td>
</tr>
<tr>
<td>FINC 409</td>
<td>Survey of Finance Principles</td>
</tr>
</tbody>
</table>

Statistics

Select one course from the following: 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSM 351</td>
<td>Geographic Information Systems for Resource Management</td>
</tr>
<tr>
<td>GEOG 390</td>
<td>Principles of Geographic Information Systems</td>
</tr>
<tr>
<td>RENR 405</td>
<td>GIS for Environmental Problem Solving</td>
</tr>
</tbody>
</table>

Computer Programming

Select one course from the following: 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>ISYS 209</td>
<td>Business Information Systems Concepts</td>
</tr>
<tr>
<td>RENR 201</td>
<td>Computer Applications in Agriculture</td>
</tr>
</tbody>
</table>

Sociology

Select one course from the following: 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOCi 217</td>
<td>Introduction to Race and Ethnicity</td>
</tr>
<tr>
<td>SOCi 317/</td>
<td>Racial and Ethnic Relations</td>
</tr>
<tr>
<td>AFST 317</td>
<td></td>
</tr>
<tr>
<td>SOCi 323/</td>
<td>Sociology of African Americans</td>
</tr>
<tr>
<td>AFST 323</td>
<td></td>
</tr>
<tr>
<td>SOCi 412</td>
<td>Political Sociology</td>
</tr>
<tr>
<td>SOCi 415</td>
<td>Sociology of Education</td>
</tr>
</tbody>
</table>

Free Electives

Courses not taken elsewhere 10

University Core Curriculum

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
</tr>
</tbody>
</table>

Mathematics elective

Select two courses from the following: 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 141</td>
<td>Business Mathematics</td>
</tr>
</tbody>
</table>
The department maintains links with other resource-management programs within the University as well as exchange programs with other academic entities. Supporting programs at Texas A&M include the resource management programs in Rangeland Ecology and Management, Wildlife and Fisheries Sciences, and the Sports Management Specialization in the Department of Health and Kinesiology.

Community Recreation and Park Administration Certificate

Management of recreation, park and leisure-service agencies requires expertise in problem-solving, decision-making, assessment of social and environmental impacts, personnel, public relations, volunteer management, financing and fund-raising, marketing of services, and needs assessments. Skills in working with people in the legal and political environment are necessary, as well as the ability to assess and work with other organizations for cooperative developments in recreation and tourism. Utilizing computer based decision-aids, students in this emphasis prepare for managerial careers with public recreation and park agencies, youth agencies, not-for-profit recreation agencies, and commercial recreation enterprises.

Program Requirements

Recreation, Park and Tourism Sciences - BS, Community Recreation and Park Administration Certificate

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 209</td>
<td>Survey of Accounting Principles</td>
<td>3</td>
</tr>
<tr>
<td>AGCJ 404</td>
<td>Communicating Agricultural Information to the Public</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 210</td>
<td>or Technical and Business Writing</td>
<td>3</td>
</tr>
<tr>
<td>RENR 201</td>
<td>Computer Applications in Agriculture</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 201</td>
<td>Foundations of Recreation, Parks and Tourism</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 302</td>
<td>Application of Tourism Principles</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 311</td>
<td>Planning and Implementation of Events and Programs</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 336</td>
<td>Research and Analysis in Recreation and Tourism</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 340</td>
<td>Recreation, Parks, Tourism and Diverse Populations</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 481</td>
<td>Seminar</td>
<td>1</td>
</tr>
<tr>
<td>RPTS 484</td>
<td>Internship</td>
<td>6</td>
</tr>
<tr>
<td>STAT 201</td>
<td>Elementary Statistical Inference</td>
<td>3</td>
</tr>
<tr>
<td>or STAT 302</td>
<td>or Statistical Methods</td>
<td>3</td>
</tr>
<tr>
<td>or STAT 303</td>
<td>or Statistical Methods</td>
<td>3</td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 44

The undergraduate curriculum leading to a Bachelor of Science degree with a major in Recreation, Park and Tourism Sciences provides students with an education in recreation, park and tourism sciences, with an emphasis on problem-solving skills, development of an international perspective and the application of scientific principles to managerial problems. The first two years of studies build a foundation that spans a wide range of disciplines and bodies of knowledge in the arts and sciences and provide the student with an introduction to the history and concepts of recreation, park and tourism sciences. The second two years prepare students with the knowledge and skills for both entry-level positions and for future professional growth in the field. In addition to core courses, students must fulfill requirements for at least one certificate, but may earn additional certificates.

Through the curriculum, students develop the depth and breadth of knowledge needed to scientifically investigate and select among alternatives as well as the intellectual skills to organize and integrate their knowledge in new and more effective patterns. An education in recreation, park and tourism sciences prepares students to become professionals with the capacity to learn from life and throughout life.
The department maintains links with other resource-management programs within the University as well as exchange programs with other academic entities. Supporting programs at Texas A&M include the resource management programs in Rangeland Ecology and Management, Wildlife and Fisheries Sciences, and the Sports Management Specialization in the Department of Health and Kinesiology.

**Parks and Conservation Certificate**

This option focuses on management of natural and cultural resources associated with conserving parks, and other protected areas, while also providing for their use by people. Land managers and related professionals operate within a variety of forums that require the integration of concepts in the environmental, social and behavioral sciences, along with policy and administrative decision-making. Necessary skills include computer applications for natural resource management, planning and design related to natural and cultural resources. Students with an option in this field look forward to careers with both public and private employers in the recreation, park and tourism fields, including state and federal agencies and private enterprises, non-profit organizations, camps and environmental education programs.

**Program Requirements**

**Parks and Conservation Certificate**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPTS 460</td>
<td>Nature, Values, and Protected Areas</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 304</td>
<td>Administration of Recreation Resource Agencies</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 307</td>
<td>Methods of Environmental Interpretation</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 316</td>
<td>Recreational Management of Wildlands</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 402</td>
<td>Park Planning and Design</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 403</td>
<td>Financing and Marketing Recreation, Park and</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Tourism Resources</td>
<td></td>
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</tbody>
</table>

Free electives 25

**Total Semester Credit Hours 44**

---

**Recreation, Park and Tourism Sciences - BS, Parks and Conservation Certificate**

The undergraduate curriculum leading to a Bachelor of Science degree with a major in Recreation, Park and Tourism Sciences provides students with an education in recreation, park and tourism sciences, with an emphasis on problem-solving skills, development of an international perspective and the application of scientific principles to managerial problems. The first two years of studies build a foundation that spans a wide range of disciplines and bodies of knowledge in the arts and sciences and provide the student with an introduction to the history and concepts of recreation, park and tourism sciences. The second two years prepare students with the knowledge and skills for both entry-level positions and for future professional growth in the field. In addition to core courses, students must fulfill requirements for at least one certificate, but may earn additional certificates.

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---

**Select two of the following:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 141</td>
<td>Business Mathematics I</td>
<td>6</td>
</tr>
<tr>
<td>MATH 142</td>
<td>Business Mathematics II</td>
<td>3</td>
</tr>
<tr>
<td>PHIL 240</td>
<td>Introduction to Logic</td>
<td>1</td>
</tr>
<tr>
<td>KINE 120</td>
<td>The Science of Basic Health and Fitness</td>
<td>1</td>
</tr>
<tr>
<td>RENR 205</td>
<td>Fundamentals of Ecology</td>
<td>3</td>
</tr>
<tr>
<td>RENR 215</td>
<td>Fundamentals of Ecology--Laboratory</td>
<td>1</td>
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<tr>
<td>Biological elective 4</td>
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</table>

**Select one of the following:**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>BIOL 101</td>
<td>Botany</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 107</td>
<td>Zoology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 113</td>
<td>Essentials in Biology</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>&amp; CHEM 111</td>
<td>Fundamentals of Chemistry Laboratory I</td>
<td></td>
</tr>
<tr>
<td>CHEM 103</td>
<td>Structure and Bonding &amp; Physical and Chemical Principles 113</td>
<td></td>
</tr>
<tr>
<td>CHEM 107</td>
<td>General Chemistry for Engineering Students</td>
<td>3</td>
</tr>
<tr>
<td>&amp; CHEM 117</td>
<td>General Chemistry for Engineering Students</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 101</td>
<td>Principles of Geology</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 201</td>
<td>College Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 218</td>
<td>Mechanics</td>
<td>3</td>
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</tbody>
</table>

**Language, Philosophy and Culture (p. 21)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creative Arts (p. 22) 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social and Behavioral Sciences (p. 23) 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**POLS 206** | American National Government                      | 3            |
**POLS 207** | State and Local Government                        | 3            |
**HIST 105** | History of the United States                      | 3            |
**HIST 106** | History of the United States                      | 3            |

**Total Semester Credit Hours 76**

1 The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement.
RPTS 484 Internship 6

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 201</td>
<td>Elementary Statistical Inference</td>
<td>3</td>
</tr>
<tr>
<td>STAT 302</td>
<td>Statistical Methods</td>
<td>3</td>
</tr>
<tr>
<td>STAT 303</td>
<td>Statistical Methods</td>
<td>3</td>
</tr>
</tbody>
</table>

**University Core Curriculum**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
</tbody>
</table>

Select two of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 141</td>
<td>Business Mathematics I</td>
<td>6</td>
</tr>
<tr>
<td>MATH 142</td>
<td>Business Mathematics II</td>
<td>6</td>
</tr>
<tr>
<td>PHIL 240</td>
<td>Introduction to Logic</td>
<td>3</td>
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<tr>
<td>KINE 120</td>
<td>The Science of Basic Health and Fitness</td>
<td>1</td>
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<td>3</td>
</tr>
<tr>
<td>RENR 215</td>
<td>Fundamentals of Ecology--Laboratory</td>
<td>3</td>
</tr>
</tbody>
</table>

Biological elective 4

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 107</td>
<td>Zoology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 113</td>
<td>Essentials in Biology</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 101 Fundamentals of Chemistry I</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 103 Structure and Bonding</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 113</td>
<td>and Physical and Chemical Principles</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 107 General Chemistry for Engineering Students</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 117</td>
<td>and General Chemistry for Engineering Students Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 101 Principles of Geology</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>PHYS 201 College Physics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>PHYS 218 Mechanics</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Language, Philosophy and Culture (p. 21) 3

Creative Arts (p. 22) 3

Social and Behavioral Sciences (p. 23) 3

POLS 206 American National Government 3

POLS 207 State and Local Government 3

HIST 105 History of the United States 3

HIST 106 History of the United States 3

**Total Semester Credit Hours** 76

The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement.

Recreation, Park and Tourism Sciences - BS, Tourism Management Certificate

The undergraduate curriculum leading to a Bachelor of Science degree with a major in Recreation, Park and Tourism Sciences provides students with an education in recreation, park and tourism sciences, with an emphasis on problem-solving skills, development of an international perspective and the application of scientific principles to managerial problems. The first two years of studies build a foundation that spans a wide range of disciplines and bodies of knowledge in the arts and sciences and provide the student with an introduction to the history and concepts of recreation, park and tourism sciences. The second two years prepare students with the knowledge and skills for both entry-level positions and for future professional growth in the field. In addition to core courses, students must fulfill requirements for at least one certificate, but may earn additional certificates.

Through the curriculum, students develop the depth and breadth of knowledge needed to scientifically investigate and select among alternatives as well as the intellectual skills to organize and integrate their knowledge in new and more effective patterns. An education in recreation, park and tourism sciences prepares students to become professionals with the capacity to learn from life and throughout life.

The department maintains links with other resource-management programs within the University as well as exchange programs with other academic entities. Supporting programs at Texas A&M include the resource management programs in Rangeland Ecology and Management, Wildlife and Fisheries Sciences, and the Sports Management Specialization in the Department of Health and Kinesiology.

Tourism Management Certificate

Tourism is one of the world’s largest and most diverse industries. To help students prepare for tourism careers, this option area introduces issues pertaining to the management, development, and promotion of places and events as tourism attractions. Courses in tourism are designed to collectively build understanding about the links that exist between local places, host populations, and various public, private and special interest groups. Students also develop competencies in assessing economic, environmental, social and political impacts of tourism, as well as in tourism marketing. Students in this option can pursue careers in private sector enterprises, government agencies, convention and visitor bureaus, and other tourism-related service organizations.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPTS 320</td>
<td>Event Management and Operations I</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 331</td>
<td>Tourism Marketing</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 401</td>
<td>Tourism and Recreation Enterprises (each is a W course)</td>
<td>4</td>
</tr>
<tr>
<td>RPTS 426</td>
<td>Tourism Impacts (W course)</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 423</td>
<td>Tourism Management</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 421</td>
<td>Tourism and Recreation Enterprises, Park and Tourism Resources</td>
<td>3</td>
</tr>
<tr>
<td>RENR 201</td>
<td>Computer Applications in Agriculture</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours** 44
RPTS 201 Foundations of Recreation, Parks and Tourism 3
RPTS 302 Application of Tourism Principles 3
RPTS 311 Planning and Implementation of Events and Programs 3
RPTS 336 Research and Analysis in Recreation and Tourism 3
RPTS 340 Recreation, Parks, Tourism and Diverse Populations 3
RPTS 481 Seminar 1
RPTS 484 Internship 6
Select one of the following:
  STAT 201 Elementary Statistical Inference 3
  STAT 302 Statistical Methods 3
  STAT 303 Statistical Methods 3

University Core Curriculum
COMM 203 Public Speaking 3
ENGL 104 Composition and Rhetoric 3
Select two of the following: 6
  MATH 141 Business Mathematics I 3
  MATH 142 Business Mathematics II 3
  PHIL 240 Introduction to Logic 3
KINE 120 The Science of Basic Health and Fitness 1
RENR 205 Fundamentals of Ecology 3
RENR 215 Fundamentals of Ecology--Laboratory 1
Biological elective 4
  BIOL 101 Botany 3
  BIOL 107 Zoology 3
  BIOL 111 Introductory Biology I 3
  BIOL 113 Essentials in Biology 3
CHEM 101 Fundamentals of Chemistry I 3
CHEM 102 Fundamentals of Chemistry Laboratory I 1
CHEM 103 Structure and Bonding 3
CHEM 104 and Physical and Chemical Principles 1
CHEM 105 and General Chemistry for Engineering Students 3
CHEM 106 and General Chemistry for Engineering Students Laboratory 1
GEOL 101 Principles of Geology 3
PHYS 201 College Physics 3
PHYS 202 Mechanics 3

The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement.

Recreation, Park and Tourism Sciences - BS, Youth Development Certificate

The undergraduate curriculum leading to a Bachelor of Science degree with a major in Recreation, Park and Tourism Sciences provides students with an education in recreation, park and tourism sciences, with an emphasis on problem-solving skills, development of an international perspective and the application of scientific principles to managerial problems. The first two years of studies build a foundation that spans a wide range of disciplines and bodies of knowledge in the arts and sciences and provide the student with an introduction to the history and concepts of recreation, park and tourism sciences. The second two years prepare students with the knowledge and skills for both entry-level positions and for future professional growth in the field. In addition to core courses, students must fulfill requirements for at least one certificate, but may earn additional certificates.

Through the curriculum, students develop the depth and breadth of knowledge needed to scientifically investigate and select among alternatives as well as the intellectual skills to organize and integrate their knowledge in new and more effective patterns. An education in recreation, park and tourism sciences prepares students to become professionals with the capacity to learn from life and throughout life.

The department maintains links with other resource-management programs within the University as well as exchange programs with other academic entities. Supporting programs at Texas A&M include the resource management programs in Rangeland Ecology and Management, Wildlife and Fisheries Sciences, and the Sports Management Specialization in the Department of Health and Kinesiology.

Youth Development Certificate

This option focuses on programs and services that contribute to the development of young people’s personal, physical, social and educational abilities. Youth workers are program developers, leaders and managers who need to be able to work with youth, families, organizations and communities. Coursework in this option focuses on positive youth development, program planning and evaluation, methods for working with young people, and societal factors that both contribute to and inhibit the development of young people. Students with an option in this field look forward to careers with non-profit, public and for-profit agencies that supply youth development opportunities for young people. Settings include after-school programs, community programs, camps, outdoor adventure and church-related recreation programs.

Program Requirements
Youth Development Certificate
RPTS 304 Administration of Recreation Resource Agencies 3
RPTS 370 Youth Development Organizations and Services 3
RPTS 371 Understanding and Developing Effective Skills for Youth Development 3
RPTS 474 Management of Programs and Services for Youth 4
RPTS 478 Youth Development Practice 3
Departmental electives 3
Free electives 25

Total Semester Credit Hours 76

The department maintains links with other resource-management programs within the University as well as exchange programs with other academic entities. Supporting programs at Texas A&M include the resource management programs in Rangeland Ecology and Management, Wildlife and Fisheries Sciences, and the Sports Management Specialization in the Department of Health and Kinesiology.
### Recreation, Park and Tourism Sciences

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 209</td>
<td>Survey of Accounting Principles</td>
<td>3</td>
</tr>
<tr>
<td>AGCJ 404</td>
<td>Communicating Agricultural Information to the Public</td>
<td>3</td>
</tr>
<tr>
<td>or ENGL 210</td>
<td>or Technical and Business Writing</td>
<td></td>
</tr>
<tr>
<td>RENR 201</td>
<td>Computer Applications in Agriculture</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 201</td>
<td>Foundations of Recreation, Parks and Tourism</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 302</td>
<td>Application of Tourism Principles</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 311</td>
<td>Planning and Implementation of Events and Programs</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 336</td>
<td>Research and Analysis in Recreation and Tourism</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 340</td>
<td>Recreation, Parks, Tourism and Diverse Populations</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 481</td>
<td>Seminar</td>
<td>1</td>
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<tr>
<td>RPTS 484</td>
<td>Internship</td>
<td>6</td>
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<tr>
<td>Select one of the following:</td>
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<td>3</td>
</tr>
<tr>
<td>STAT 201</td>
<td>Elementary Statistical Inference</td>
<td></td>
</tr>
<tr>
<td>STAT 302</td>
<td>Statistical Methods</td>
<td></td>
</tr>
<tr>
<td>STAT 303</td>
<td>Statistical Methods</td>
<td></td>
</tr>
</tbody>
</table>

### University Core Curriculum

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>Select two of the following:</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Business Mathematics I</td>
<td></td>
</tr>
<tr>
<td>MATH 142</td>
<td>Business Mathematics II</td>
<td></td>
</tr>
<tr>
<td>PHIL 240</td>
<td>Introduction to Logic</td>
<td></td>
</tr>
<tr>
<td>KINE 120</td>
<td>The Science of Basic Health and Fitness</td>
<td>1</td>
</tr>
<tr>
<td>RENR 205</td>
<td>Fundamentals of Ecology</td>
<td>3</td>
</tr>
<tr>
<td>RENR 215</td>
<td>Fundamentals of Ecology--Laboratory</td>
<td>1</td>
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<tr>
<td>Biological elective</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 101</td>
<td>Botany</td>
<td></td>
</tr>
<tr>
<td>BIOL 107</td>
<td>Zoology</td>
<td></td>
</tr>
<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
<td></td>
</tr>
<tr>
<td>BIOL 113</td>
<td>Essentials in Biology</td>
<td></td>
</tr>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
<td></td>
</tr>
<tr>
<td>CHEM 103</td>
<td>Structure and Bonding</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 113</td>
<td>and Physical and Chemical Principles</td>
<td></td>
</tr>
<tr>
<td>CHEM 107</td>
<td>General Chemistry for Engineering Students</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 117</td>
<td>and General Chemistry for Engineering Students Laboratory</td>
<td></td>
</tr>
<tr>
<td>GEOL 101</td>
<td>Principles of Geology</td>
<td></td>
</tr>
<tr>
<td>PHYS 201</td>
<td>College Physics</td>
<td></td>
</tr>
<tr>
<td>PHYS 218</td>
<td>Mechanics</td>
<td></td>
</tr>
<tr>
<td>Language, Philosophy and Culture (p. 21)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Creative Arts (p. 22)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Social and Behavioral Sciences (p. 23)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
</tr>
<tr>
<td>HIST 105</td>
<td>History of the United States</td>
<td>3</td>
</tr>
<tr>
<td>HIST 106</td>
<td>History of the United States</td>
<td>3</td>
</tr>
</tbody>
</table>

### Total Semester Credit Hours

- **76**

The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement.

### Park and Natural Resource Management - Minor

An 18 credit hour minor in Park and Natural Resource Management provides a broad orientation of the following:

Management of natural and cultural resources associated with conserving parks and other protected areas. Land managers and related professionals integrate concepts in the bio-environmental sciences, social and behavioral sciences, and policy and administrative decision-making. Necessary skills include geographic information systems, impact assessment methodology, and heritage and natural resources planning techniques. Students with an emphasis in this field look forward to careers with both public and private employers in the recreation, park, and tourism fields, including state and federal agencies and private enterprises, nonprofit organizations, youth camps, and environmental education programs.

#### Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>RENR 375</td>
<td>Conservation of Natural Resources</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 201</td>
<td>Foundations of Recreation, Parks and Tourism</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 301</td>
<td>Leisure and Outdoor Recreation in American Culture</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 307</td>
<td>Methods of Environmental Interpretation</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 316</td>
<td>Recreational Management of Wildlands</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 460/</td>
<td>Nature, Values, and Protected Areas</td>
<td>3</td>
</tr>
<tr>
<td>RENR 460</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Total Semester Credit Hours

- **18**

1 If you do not wish to take an online course, see RPTS Academic Advisor for course substitutions.

Students must make a grade of "C" or better in all courses.

All courses must be taken in residence at Texas A&M University.

An internship, RPTS 484, is available for minors above the required 18 hours.

### Tourism Management - Minor

An 18 credit hour minor in Tourism Management provides a broad orientation of the following:

Tourism is one of the world’s largest and most diverse industries. This option focuses on the planning, management, development, and promotion of places and events as tourism attractions. Courses in tourism are designed to collectively build understanding about the linkages that exist between local places and cultures, host populations, and various public, private, and special interest groups. Students in this emphasis can pursue careers in private sector enterprises, government agencies,
Program Requirements

Select six courses from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPTS 302</td>
<td>Application of Tourism Principles</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 311</td>
<td>Planning and Implementation of Events and Programs</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 320</td>
<td>Event Management and Operations I</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 331</td>
<td>Tourism Marketing</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 340</td>
<td>Recreation, Parks, Tourism and Diverse Populations</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 360</td>
<td>Ecotourism: Principles and Practices</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 423</td>
<td>Tourism Management (Fall Only)</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 426</td>
<td>Tourism Impacts</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 18

Students must make a grade of "C" or better in all courses.

Courses must be taken in residence at Texas A&M.

An internship (RPTS 484) is available for minors above required 18 hours.

Professional Event Manager - Certificate

Open to All Majors

The Professional Event Manager Certificate (PEMC), offered by the Department of Recreation, Park and Tourism Sciences, is designed to provide students with an understanding of and the ability to plan, implement, and evaluate festivals, fairs and special events in a variety of governmental, not-for-profit and commercial settings.

Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPTS 304</td>
<td>Administration of Recreation Resource Agencies</td>
<td>3</td>
</tr>
<tr>
<td>or RPTS 423</td>
<td>Tourism Management</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 311</td>
<td>Planning and Implementation of Events and Programs</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 320</td>
<td>Event Management and Operations I</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 321</td>
<td>Event Management and Operations II</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following:

- AGCJ 306 Theory and Practice of Agricultural Public Relations 3
- ALED 344 Leadership of Volunteers 3
- RPTS 331 Tourism Marketing 3

Class on Event Management Program Coordinating Committee elective courses list.

Total Semester Credit Hours 15

1 Students should review the list of electives prepared by the Event Management Program Coordinating Committee. The courses listed are included on the full list.

The PEMC program requires a minimum of 15 credit hours in designated courses. Also, students must earn a grade of "C" or better in each course used to meet the requirements. Students who pursue the PEMC must complete all requirements prior to graduation. Specific certificate requirements are available in the Undergraduate Programs Office of the Department of Recreation, Park and Tourism Sciences and of cooperating units. Details are also available on our website.

Tourism and Hospitality Management - Certificate

The Certificate in Tourism and Hospitality Management, offered by the Department of Recreation, Park and Tourism Sciences, is designed to provide students with an understanding of the planning, analysis, and decision-making techniques needed for management positions in the tourism and hospitality industries. Students will study and develop skills related to principles of management, sustainability, development, cultural tolerance, marketing, finance, and service quality as they apply to the hospitality and tourism industries.

Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPTS 302</td>
<td>Application of Tourism Principles</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 331</td>
<td>Tourism Marketing</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 421</td>
<td>Planning and Implementation of Events in Resorts and Hotels</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 423</td>
<td>Tourism Management</td>
<td>3</td>
</tr>
<tr>
<td>RPTS 444</td>
<td>Service Quality for Hospitality Organizations</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 15

Department of Soil and Crop Sciences

Undergraduate Students who complete the undergraduate course of study receive the degree of Bachelor of Science in Plant and Environmental Soil Science and Turfgrass Science.

The B.S. degrees require a minimum of 120 credit hours. Details of course requirements are given below and in the Texas A&M University Undergraduate Catalog. Information on undergraduate admissions, including how to order a catalog, can be obtained from the Office of Admissions (http://admissions.tamu.edu). We encourage prospective students to make an appointment with an academic advisor prior to applying.

Undergraduates are required to complete an internship, undergraduate research or study abroad. Soil and Crop Sciences offers a wide variety of experiential learning opportunities for students to achieve their graduation needs. Students are able to complete their experiential learning requirement regionally, nationally, or internationally. Information about undergraduate research and internship opportunities can be obtained from students’ academic advisors and professors.

Faculty

Aitkenhead, Jacqueline A, Associate Professor
Soil & Crop Sciences
PhD, University of New Hampshire, 2000

Awika, Joseph M, Associate Professor
Soil & Crop Sciences
PhD, Texas A&M University, 2003
Bagavathiannan, Muthukumar V, Assistant Professor
Soil & Crop Sciences
PhD, University of Manitoba, 2009

Baltensperger, David D, Professor
Soil & Crop Sciences
PhD, New Mexico State University, 1981

Baumann, Paul A, Professor & Extension Specialist
Soil & Crop Sciences
PhD, Texas Tech University, 1981

Boellstorff, Diane E, Assistant Professor & Extension Specialist
Soil & Crop Sciences
PhD, University of California, 1991

Cralle, Harry T, Associate Professor
Soil & Crop Sciences
PhD, University of Minnesota, 1979

Dasilva, Jorge A, Professor
Soil & Crop Sciences
PhD, Cornell University, 1993

Deng, Youjun, Associate Professor
Soil & Crop Sciences
PhD, Texas A&M University, 2001

Dou, Fugen, Assistant Professor
Soil & Crop Sciences
PhD, Texas A&M University, 2005

Feagley, Sam E, Professor & Extension Specialist
Soil & Crop Sciences
PhD, University of Missouri, 1979

Finlayson, Scott A, Associate Professor
Soil & Crop Sciences
PhD, University of Calgary, 1994

Gentry, Terry J, Associate Professor
Soil & Crop Sciences
PhD, University of Arizona, 2003

Hague, Steven S, Associate Professor
Soil & Crop Sciences
PhD, Texas A&M University, 2000

Hays, Dirk B, Professor
Soil & Crop Sciences
PhD, University of Calgary, 1997

Heilman, James L, Professor
Soil & Crop Sciences
PhD, Kansas State University, 1977

Herrman, Timothy J, Professor
Soil & Crop Sciences
PhD, University of Idaho, 1992
DVM, The University of Idaho, 1977

Hons, Frank M, Professor
Soil & Crop Sciences
PhD, Texas A&M University, 1978

Hussey, Mark A, Professor
Soil & Crop Sciences
PhD, Texas A&M University, 1983

Ibrahim, Amir M, Professor
Soil & Crop Sciences
PhD, Colorado State University, 1998

Jessup, Russell W, Assistant Professor
Soil & Crop Sciences
PhD, Texas A&M University, 2005

McInnes, Kevin J, Professor
Soil & Crop Sciences
PhD, Kansas State University, 1985

Morgan, Cristine L, Professor
Soil & Crop Sciences
PhD, University of Wisconsin, 2003

Morgan, Gaylon D, Professor & Extension Specialist
Soil & Crop Sciences
PhD, University of Wisconsin, 2001

Murray, Seth C, Associate Professor
Soil & Crop Sciences
PhD, Cornell University, 2008

Neely, Clark B, Assistant Professor & Extension Specialist
Soil & Crop Sciences
PhD, Texas A&M University, 2013

Neely, Haly L, Assistant Professor
Soil & Crop Sciences
PhD, Texas A&M University, 2014

Provin, Tony L, Professor & Extension Specialist
Soil & Crop Sciences
MS, Iowa State University, 1991

Rajan, Nithya, Assistant Professor
Soil & Crop Sciences
PhD, Texas Tech University, 2007

Rathore, Keerti S, Professor
Soil & Crop Sciences
PhD, Imperial College, London, 1981

Redmon, Larry A, Professor & Extension Specialist
Soil & Crop Sciences
PhD, Texas A&M University, 1992

Rooney, Lloyd W, Senior Professor
Soil & Crop Sciences
PhD, Kansas State University, 1966

Rooney, William L, Professor
Soil & Crop Sciences
PhD, University of Minnesota, 1992

Rouquette, Francis, Professor
Soil & Crop Sciences
PhD, Texas A&M University, 1970
College of Agriculture and Life Sciences

Schnell, Ronnie W, Assistant Professor & Extension Specialist
Soil & Crop Sciences
PhD, Texas A&M University, 2010

Schwab, Arthur P, Professor
Soil & Crop Sciences
PhD, Colorado State University, 1981

Smith, C W, Professor
Soil & Crop Sciences
PhD, University of Tennessee, 1974

Stelly, David M, Professor
Soil & Crop Sciences
PhD, University of Wisconsin-Madison, 1983

Tabien, Rodante E, Associate Professor
Soil & Crop Sciences
PhD, Texas A&M University, 1996

Tarpley, Lee, Associate Professor
Soil & Crop Sciences
PhD, Texas A&M University, 1993

Wherley, Benjamin G, Assistant Professor
Soil & Crop Sciences
PhD, North Carolina State University, 2008

White, Richard H, Professor
Soil & Crop Sciences
PhD, Virginia Tech, 1985

Zhang, Hongbin, Professor
Soil & Crop Sciences
PhD, University of California, Davis, 1990

Majors

• Bachelor of Science in Plant and Environmental Soil Science, Crops Emphasis (p. 181)
• Bachelor of Science in Plant and Environmental Soil Science, Soil and Water Emphasis (p. 182)
• Bachelor of Science in Turfgrass Science (p. 183)

Minors

• Agronomy Minor (p. 184)
• Environmental Soil Science Minor (p. 184)

Plant and Environmental Soil Science - BS, Crops Emphasis

Curriculum in Plant and Environmental Soil Science is administered by the Department of Soil and Crop Sciences. Students following this curriculum develop and utilize basic scientific knowledge to understand the most fundamental resources—plants, soils, and water—and the interaction of these resources in different environmental settings. The required courses provide an essential foundation in several disciplines, while the elective courses can be selected to meet the interests, needs and objectives of individual students.

Based on professional goals and objectives, students will select an emphasis in crops or soil and water. The crops emphasis focuses on the principles involved in the production, management, marketing and use of fiber, forage, grain, biofuel and oilcrops. In the soil and water emphasis, students will study the nature, properties, management, conservation, and use of soils and water. The graduate in Plant and Environmental Soil and Science may choose a career in: education—consulting, extension, or public relations; production agriculture—biofuel or seed production, farming, or farm management; soil and water resource management—soil surveying, land appraisal, land use planning, conservation and pollution abatement, or watershed management; environmental—pollution control and environmental protection as affected by plant-soil-water interactions.

Flexible curricula are provided so that each student, in consultation with their academic advisor, can design a degree program that best serves the student’s career objectives.

Program Requirements

Department of Soil and Crop Sciences Core Courses

CHEM 222 Elements of Organic and Biological Chemistry 3
SCSC 205 Problem Solving in Plant and Soil Systems 3
SCSC 301 Soil Science 4
SCSC 307 Crop Biology and Physiology 4
SCSC 309 Water in Soils and Plants 4
SCSC 481 Senior Seminar 2

Experiential requirement
Select one of the following: 3
SCSC 420 Brazilian Agriculture and Food Production Systems
SCSC 421 International Agricultural Research Centers - Mexico

SCSC 423 Natural Resources and Agricultural Sustainability in UK
SCSC 484 Internship
SCSC 491 Research

STAT 302 Statistical Methods 3
or ESSM 313 or Vegetation Sampling Methods and Designs in Ecosystems

Pest Management
Select two of the following: 7-8
PLPA 301 Plant Pathology
& PLPA 303 Plant Pathology Laboratory
ENTO 201 General Entomology

ENTO 401 Principles of Integrated Pest Management
SCSC 446 Weed Management and Ecology

Ecology
RENV 205 Fundamentals of Ecology or SCSC 444 or Forage Ecology and Management

Crops Emphasis

SCSC 304 Plant Breeding and Genetics 3
SCSC 311 Principles of Crop Production 3
SCSC 402 Crop Stress Management 4
SCSC 410 International Agricultural Systems 3
SCSC 441 Crop Production Systems 3

Directed electives 1 9
Free electives 16-17

University Core Curriculum Requirements

AGEC 105 Introduction to Agricultural Economics 3
Plant and Environmental Soil Science - BS, Soil and Water Emphasis

Curriculum in Plant and Environmental Soil Science is administered by the Department of Soil and Crop Sciences. Students following this curriculum develop and utilize basic scientific knowledge to understand the most fundamental resources—plants, soils, and water—and the interaction of these resources in different environmental settings. The required courses provide an essential foundation in several disciplines, while the elective courses can be selected to meet the interests, needs and objectives of individual students.

Based on professional goals and objectives, students will select an emphasis in crops or soil and water. The crops emphasis focuses on the principles involved in the production, management, marketing and use of fiber, forage, grain, biofuel and oilcrops. In the soil and water emphasis, students will study the nature, properties, management, conservation, and use of soils and water. The graduate in Plant and Environmental Soil and Science may choose a career in: education—consulting, extension, or public relations; production agriculture—biofuel or seed production, farming, or farm management; soil and water resource management—soil surveying, land appraisal, land use planning, conservation and pollution abatement, or watershed management; environmental—pollution control and environmental protection as affected by plant-soil-water interactions.

Flexible curricula are provided so that each student, in consultation with their academic advisor, can design a degree program that best serves the student’s career objectives.

Program Requirements

Department of Soil and Crop Sciences Core Courses

CHEM 222 Elements of Organic and Biological Chemistry 3
SCSC 205 Problem Solving in Plant and Soil Systems 3
SCSC 301 Soil Science 4
SCSC 307 Crop Biology and Physiology 4
SCSC 309 Water in Soils and Plants 4
SCSC 481 Senior Seminar 2

Experiential requirement

Select one of the following: 3

SCSC 420 Brazilian Agriculture and Food Production Systems
SCSC 421 International Agricultural Research Centers - Mexico
SCSC 423 Natural Resources and Agricultural Sustainability in UK

Pest Management

Select two of the following: 7-8

PLPA 301 & PLPA 303 Plant Pathology and Plant Pathology Laboratory
ENTO 201 General Entomology
ENTO 401 Principles of Integrated Pest Management
SCSC 446 Weed Management and Ecology

Ecology

RENR 205 Fundamentals of Ecology 3
or SCSC 444 Forage Ecology and Management

Soil and Water Emphasis

GEOG 390 Principles of Geographic Information Systems 4
or ESSM 351 or Geographic Information Systems for Resource Management

SCSC 310 Soil Morphology and Interpretations 2
SCSC 405 Soil and Water Microbiology 4
SCSC 422 Soil Fertility and Plant Nutrient Management 3
SCSC 432 Soil Fertility and Plant Nutrient Management Laboratory 1
SCSC 455 Environmental Soil and Water Science 3
SCSC 458 Watershed and Water Quality Management 3

Directed electives 1 6

Free electives 16-17
American history elective (p. 23) 6  
Communication elective (p. 20) 3  
Creative arts elective (p. 22) 2 3  
Government/Political science elective (p. 23) 3 6  
Language, philosophy and culture elective (p. 21) 2 3  
Life and physical sciences 5  
Select from the following:  
BIOL 101 Botany  
BIOL 111 Introductory Biology I  
BIOL 113 Essentials in Biology  
CHEM 102 Fundamentals of Chemistry II  
GEOL 101 Principles of Geology  
PHYS 201 College Physics  
PHYS 218 Mechanics  
Mathematics elective (MATH prefix required) (p. 20) 6  

Total Semester Credit Hours 120 1

1 To be selected from soils emphasis courses.
2 The Graduation requirements include a requirement for six hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement. See academic advisor.
3 Credit by examination may be used to substitute for courses.

Turfgrass Science - BS

Curriculum in Turfgrass Science is administered by the Department of Soil and Crop Sciences. Students following this curriculum develop and utilize basic scientific knowledge to understand the most fundamental resources—turfgrass, soils, and water—and the interaction of these resources in different environmental settings. The required courses provide an essential foundation, while the elective courses (i.e., ornamental horticulture, plant protection, business, landscape architecture) can be selected to meet the interests, needs and objectives of individual students.

Turfgrass Science prepares graduates for careers in: management—golf courses, athletic fields, public, private or commercial grounds; production agriculture—turfgrass production, or plant breeding; agribusiness—seed sales, turf equipment and supplies, landscape contractor, commercial or home lawn care specialists; education—consulting, extension, or public relations.

Program Requirements

Department of Soil and Crop Sciences Core Courses  
CHEM 222 Elements of Organic and Biological Chemistry 3  
SCSC 205 Problem Solving in Plant and Soil Systems 3  
SCSC 301 Soil Science 4  
SCSC 307 Crop Biology and Physiology 4  
SCSC 309 Water in Soils and Plants 4  
SCSC 481 Senior Seminar 2  
RENIR 205 Fundamentals of Ecology 3  
or SCSC 444 or Forage Ecology and Management  
Select one of the following:  
SCSC 420 Brazilian Agriculture and Food Production Systems  
SCSC 421 International Agricultural Research Centers - Mexico  
SCSC 423 Natural Resources and Agricultural Sustainability in UK  
SCSC 484 Internship  
SCSC 491 Research  
STAT 302 Statistical Methods 3  
or ESSM 313 or Vegetation Sampling Methods and Designs in Ecosystems  
Pest management 7-8  
Select two from the following:  
PLPA 301 Plant Pathology  
& PLPA 303 and Plant Pathology Laboratory  
ENTO 201 General Entomology  
ENTO 401 Principles of Integrated Pest Management  
SCSC 446 Weed Management and Ecology  

Turfgrass Science Courses  
MGMT 309 Survey of Management 3  
SCSC 304 Plant Breeding and Genetics 3  
SCSC 402 Crop Stress Management 4  
SCSC 405 Soil and Water Microbiology 4  
SCSC 422 Soil Fertility and Plant Nutrient Management 4  
SCSC 432 Soil Fertility and Plant Nutrient Management Laboratory 4  
SCSC 458 Watershed and Water Quality Management 4  

Free electives 11-12

University Core Curriculum Requirements  
AGEC 105 Introduction to Agricultural Economics 3  
CHEM 101 Fundamentals of Chemistry I & CHEM 111 and Fundamentals of Chemistry Laboratory I 4  
COMM 203 Public Speaking 3  
American history (p. 23) 6  
Communication (p. 20) 3  
Creative arts (p. 22) 3  
Government/Political science (p. 23) 6  
POLS 206 American National Government  
POLS 207 State and Local Government  
Language, philosophy and culture (p. 21) 3  
Life and physical sciences 4  
Select 8 semester credit hours from the following:  
BIOL 101 Botany  
BIOL 111 Introductory Biology I  
BIOL 113 Essentials in Biology  


CHEM 102  Fundamentals of Chemistry II
GEOl 101  Principles of Geology
PHYS 201  College Physics
PHYS 218  Mechanics
Life and physical sciences (p. 20)  1
Mathematics (MATH prefix required) (p. 20)  6
Total Semester Credit Hours  120

1 The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement. See academic advisor.

2 Credit by examination may be used to substitute for courses.

Agronomy - Minor

The Department of Soil and Crop Sciences offers a minor in Agronomy. SCSC 105, Food & Fiber or SCSC 205, Problem Solving in Plant and Soil Science and SCSC 301, Soil Science are required. Select an additional 8 hours of course work within Soil and Crop Sciences. Please speak with an advisor concerning courses prior to registering.

Program Requirements

Required Courses:
SCSC 105  World Food and Fiber Crops  3
SCSC 301  Soil Science  4
Select eight semester credit hours from the following:  8
SCSC 302  Recreational Turf
SCSC 303  Crop Ecology
SCSC 304  Plant Breeding and Genetics
SCSC 306  Grain, Fiber and Oilseed Crops
SCSC 308  Forage Crops
SCSC 310  Soil Morphology and Interpretations
SCSC 405  Soil and Water Microbiology
SCSC 410  International Agricultural Systems
SCSC 422  Soil Fertility and Plant Nutrient Management
SCSC 428  Advanced Turf Ecology and Physiology
SCSC 430  Turfgrass Maintenance
SCSC 432  Soil Fertility and Plant Nutrient Management Laboratory
SCSC 445  Soil Physics
SCSC 450  Chemical Weed Control
SCSC 452  Chemical Weed Control Laboratory
SCSC 455  Environmental Soil and Water Science
Total Semester Credit Hours  15

Students must make a grade of "C" or better in all courses.

Environmental Soil Science - Minor

The Department of Soil and Crop Sciences offers a minor in Environmental Soil Sciences. SCSC 301, Soil Science is required. You may select from the 11 hours of soil science courses. See an advisor in for more details.

Program Requirements

SCSC 301  Soil Science  4
Select from the following:  11
SCSC 310  Soil Morphology and Interpretations
SCSC 401/ FIVS 401  Forensic Soil Science
SCSC 405  Soil and Water Microbiology
SCSC 422  Soil Fertility and Plant Nutrient Management
SCSC 432  Soil Fertility and Plant Nutrient Management Laboratory
SCSC 445  Soil Physics
SCSC 455  Environmental Soil and Water Science
Total Semester Credit Hours  15

Students must make a grade of "C" or better in all courses.

University Studies Programs

The College of Agriculture and Life Sciences offers degrees in University Studies. A University Studies degree differs from a traditional “major” in that it consists of a concentration of 26 hours and two minors of 15-18 hours each. The University Studies degree format was created to provide students the flexibility to combine areas of study that are of special interest.

Majors

- Bachelor of Science in University Studies, Environmental Business Concentration (p. 167)
- Bachelor of Science in University Studies, Leadership Studies Concentration (p. 122)

Department of Wildlife and Fisheries Sciences

The Department of Wildlife and Fisheries Sciences uses the latest in the ecological and management disciplines to provide the most diverse and progressive education available in the conservation of the earth’s biodiversity. Students in this department are interested in making contributions to solving problems associated with the extinction of species, wildlife recreational uses, food production from aquaculture, environmental education, and urban wildlife and fisheries recreational activities. The conservation and management of wildlife and fisheries resources require resolution of increasingly complex issues that extend far beyond the bounds of classical biology. Contemporary wildlife and fisheries professionals must be well-versed in the life and physical sciences, mathematics, and the language, philosophy and culture. Today’s professionals must have a problem-solving orientation that accommodates animals and their habitats within a larger ecological and socio-economic system. In addition, modern students must be familiar with molecular genetics and the principles of conservation biology. Curricula in wildlife and fisheries sciences are designed to provide both the traditional and contemporary dimensions of academic instruction necessary to transform motivated and intellectually capable students into competent professionals.
Faculty

Adams, Clark E, Professor
Wildlife & Fisheries Sciences
PhD, University of Nebraska, 1973

Cathey, James C, Associate Professor & Extension Specialist
Wildlife & Fisheries Sciences
PhD, Texas Tech University, 1997

Conway, Kevin W, Assistant Professor
Wildlife & Fisheries Sciences
PhD, Saint Louis University, 2010

Dewitt, Thomas J, Associate Professor
Wildlife & Fisheries Sciences
PhD, State University of New York at Binghamton, 1996

Dronen, Norman O, Professor
Wildlife & Fisheries Sciences
PhD, New Mexico State University, 1974

Fitzgerald, Lee A, Professor
Wildlife & Fisheries Sciences
PhD, University of New Mexico, 1993

Fujiwara, Masami, Associate Professor
Wildlife & Fisheries Sciences
PhD, Massachusetts Institute of Technology, 2002

Gatlin, Delbert M, Professor
Wildlife & Fisheries Sciences
PhD, Mississippi State University, 1983

Gelwick, Frances I, Associate Professor
Wildlife & Fisheries Sciences
PhD, University of Oklahoma, 1995

Grant, William E, Professor
Wildlife & Fisheries Sciences
PhD, Colorado State University, 1974

Hurtado Clavijo, Luis A, Associate Professor
Wildlife & Fisheries Sciences
PhD, Rutgers University, 2002

Lacher, Thomas E, Professor
Wildlife & Fisheries Sciences
PhD, University of Pittsburgh, 1980

Lawrence, Addison L, Professor
Wildlife & Fisheries Sciences
PhD, University of Missouri, 1962

Light, Jessica E, Associate Professor
Wildlife & Fisheries Sciences
PhD, Louisiana State University, 2005

Lopez, Roel R, Professor
Wildlife & Fisheries Sciences
PhD, Texas A&M University, 2001

Masser, Michael P, Professor
Wildlife & Fisheries Sciences
PhD, Texas A&M University, 1986

Mateos, Mariana, Associate Professor
Wildlife & Fisheries Sciences
PhD, Rutgers University, 2002

Mora-Zacarias, Miguel A, Professor
Wildlife & Fisheries Sciences
PhD, University of California, Davis, 1990

Morrison, Mike L, Professor
Wildlife & Fisheries Sciences
PhD, Oregon State University, 1982

Packard, Jane M, Associate Professor
Wildlife & Fisheries Sciences
PhD, University of Minnesota, 1980

Peterson, Mark J, Professor
Wildlife & Fisheries Sciences
PhD, Texas A&M University, 1994

Peterson, Tarla R, Professor
Wildlife & Fisheries Sciences
PhD, Washington State University, 1986

Roelke, Daniel L, Professor
Wildlife & Fisheries Sciences
PhD, Texas A&M University, 1997

Silvy, Nova J, Professor
Wildlife & Fisheries Sciences
PhD, Southern Illinois University, 1975

Voelker, Gary A, Associate Professor
Wildlife & Fisheries Sciences
PhD, University of Washington, 1998

Winemiller, Kirk O, Professor
Wildlife & Fisheries Sciences
PhD, University of Texas, 1987

Majors

- Bachelor of Science in Renewable Natural Resources (p. 142)
- Bachelor of Science in Wildlife and Fisheries Sciences, (p. 185) Aquatic Ecology and Conservation Option (p. 185)
- Bachelor of Science in Wildlife and Fisheries Sciences, Vertebrate Zoology Option (p. 186)
- Bachelor of Science in Wildlife and Fisheries Sciences, Wildlife Ecology and Conservation Option (p. 187)

Minors

- Wildlife and Fisheries Sciences Minor (p. 189)

Wildlife and Fisheries Sciences - BS, Aquatic Ecology and Conservation Option

Graduates are well equipped for post-baccalaureate study in many life science fields (graduate school programs and human and veterinary medicine) or for direct entry into professions such as wildlife management, fisheries management, environmental impact assessment, aquaculture, natural history museum education, zoological park collection management, public school teaching and urban wildlife management. Employers of
recent graduates include state and federal resource agencies, scientific foundations, ranches, hunting and fishing clubs, fish farms, environmental consulting firms, museums and secondary schools.

Wildlife ecology, aquatic ecology, and vertebrate zoology curriculum options lead to the Bachelor of Science degree. At the end of the sophomore year, and after consultation with his or her advisor, each student will choose a course of study from among the options within the department's curricula. The chosen option is enhanced by a common departmental “core” of courses necessary for a sound education in the wildlife and fisheries conservation professions.

Students are encouraged to develop an emphasis area within their degree option. To build this emphasis area, students will choose directed electives, from related disciplines, in consultation with their academic advisor and faculty members.

This option is designed for both, students interested in the research and management of fish, other freshwater and marine organisms, and the ecosystems that sustain them as well as controlled production of organisms in aquatic systems. Careers are available in state and federal resource agencies; fisheries management companies; nongovernmental conservation organizations; environmental consulting firms; and private consultation. In addition careers may be available in supporting areas such as quality control, supply, marketing, distribution, finance, consultation as well as domestic and foreign resource development.

Program Requirements

Wildlife and Fisheries Sciences Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 222</td>
<td>Elements of Organic and Biological Chemistry</td>
<td>3</td>
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<tr>
<td>CHEM 242</td>
<td>Elementary Organic Chemistry Laboratory</td>
<td>1</td>
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<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
<td>3</td>
</tr>
<tr>
<td>GENE 301</td>
<td>Comprehensive Genetics</td>
<td>4</td>
</tr>
<tr>
<td>&amp; GENE 312</td>
<td>and Comprehensive Genetics Laboratory</td>
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</tr>
<tr>
<td>PHYS 201</td>
<td>College Physics</td>
<td>4</td>
</tr>
<tr>
<td>RENR 205</td>
<td>Fundamentals of Ecology</td>
<td>3</td>
</tr>
<tr>
<td>STAT 302</td>
<td>Statistical Methods</td>
<td>3</td>
</tr>
<tr>
<td>WFSC 101</td>
<td>Introduction to Wildlife and Fisheries</td>
<td>4</td>
</tr>
<tr>
<td>WFSC 302</td>
<td>Natural History of the Vertebrates</td>
<td>3</td>
</tr>
<tr>
<td>WFSC 304</td>
<td>Wildlife and Fisheries Conservation</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
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<td></td>
</tr>
<tr>
<td>BIOL 388</td>
<td>Principles of Animal Physiology</td>
<td>4</td>
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<tr>
<td>VTPP 423</td>
<td>Biomedical Physiology I</td>
<td>1</td>
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<tr>
<td>WFSC 316</td>
<td>Field Herpetology</td>
<td>3</td>
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<tr>
<td>Field experience</td>
<td>3</td>
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<tr>
<td>Select one of the following:</td>
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<tr>
<td>WFSC 300/ENTO 300</td>
<td>Field Studies</td>
<td>4</td>
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<tr>
<td>WFSC 484</td>
<td>Internship</td>
<td>3</td>
</tr>
<tr>
<td>WFSC 485</td>
<td>Directed Studies</td>
<td>3</td>
</tr>
<tr>
<td>WFSC 491</td>
<td>Research</td>
<td>3</td>
</tr>
<tr>
<td>Aquatic Ecology and Conservation Option</td>
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</tr>
<tr>
<td>WFSC 311</td>
<td>Ichthyology</td>
<td>3</td>
</tr>
<tr>
<td>WFSC 414</td>
<td>Ecology of Lakes and Rivers</td>
<td>4</td>
</tr>
</tbody>
</table>

Directed electives 2  25

University Core Curriculum

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
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</tr>
<tr>
<td>BIOL 112</td>
<td>Introductory Biology II</td>
<td>4</td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>MATH 131</td>
<td>Mathematical Concepts—Calculus</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 142</td>
<td>or Business Mathematics II</td>
<td>3</td>
</tr>
<tr>
<td>PHIL 240</td>
<td>Introduction to Logic</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 141</td>
<td>or Business Mathematics I</td>
<td>3</td>
</tr>
<tr>
<td>RENR 215</td>
<td>Fundamentals of Ecology--Laboratory</td>
<td>1</td>
</tr>
</tbody>
</table>

American history electives (p. 23)  6
Creative arts elective (p. 22)  3
Government/Political science electives (p. 23)  6
Language, philosophy and culture elective (p. 21)  3
Social and behavioral science elective (p. 23)  3

Total Semester Credit Hours  120

1 Students currently enrolled at Texas A&M who wish to transfer to a Wildlife and Fisheries Sciences major must have achieved a grade of C or higher in introductory biology and mathematics courses required in the University Core Curriculum. Enrollment in Wildlife and Fisheries Sciences (WFSC) option courses will be restricted to students who have achieved a grade of C or higher in prerequisite courses.

2 Directed electives to be chosen in areas related to fisheries, aquaculture and related topics.

3 The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement.

Students are required to make a C or better in all WFSC and RENR 205/RENR 215 courses.

A total of 120 semester hours will be required for a BS degree.

Wildlife and Fisheries Sciences - BS, Vertebrate Zoology Option

Graduates are well equipped for post-baccalaureate study in many life science fields (graduate school programs and human and veterinary medicine) or for direct entry into professions such as wildlife management, fisheries management, environmental impact assessment, aquaculture, natural history museum education, zoological park collection management, public school teaching and urban wildlife management. Employers of recent graduates include state and federal resource agencies, scientific
foundations, ranches, hunting and fishing clubs, fish farms, environmental consulting firms, museums and secondary schools.

Wildlife ecology, aquatic ecology, and vertebrate zoology curriculum options lead to the Bachelor of Science degree. At the end of the sophomore year, and after consultation with his or her advisor, each student will choose a course of study from among the options within the department’s curricula. The chosen option is enhanced by a common departmental “core” of courses necessary for a sound education in the wildlife and fisheries conservation professions.

Students are encouraged to develop an emphasis area within their degree option. To build this emphasis area, students will choose directed electives, from related disciplines, in consultation with their academic advisor and faculty members.

**Vertebrate Zoology Option**

This emphasis provides the rigorous training needed for careers in the various aspects of natural resources related to the fields of ichthyology, herpetology, mammalogy and ornithology, including behavior, ecology, evolution, genetics, molecular biology, physiology and systematics. It is a flexible program which permits the inclusion of courses specifically required by schools graduate programs as well as schools of dentistry, law, medicine and veterinary medicine.

**Program Requirements**

**Wildlife and Fisheries Sciences Core Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
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<tbody>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
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</tr>
<tr>
<td>CHEM 227</td>
<td>Organic Chemistry I</td>
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<tr>
<td>CHEM 237</td>
<td>Organic Chemistry Laboratory</td>
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<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
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<tr>
<td>GENE 301</td>
<td>Comprehensive Genetics</td>
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</tr>
<tr>
<td>&amp; GENE 312</td>
<td>and Comprehensive Genetics Laboratory</td>
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<td>PHYS 201</td>
<td>College Physics</td>
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<tr>
<td>RENR 205</td>
<td>Fundamentals of Ecology</td>
<td>3</td>
</tr>
<tr>
<td>STAT 302</td>
<td>Statistical Methods</td>
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</tr>
<tr>
<td>WFSC 101</td>
<td>Introduction to Wildlife and Fisheries</td>
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<tr>
<td>WFSC 302</td>
<td>Natural History of the Vertebrates</td>
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<tr>
<td>WFSC 304</td>
<td>Wildlife and Fisheries Conservation</td>
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<tr>
<td>Choose one physiology course</td>
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<tr>
<td>WFSC 335</td>
<td>Natural History of the Invertebrates</td>
<td></td>
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<tr>
<td>VTPP 423</td>
<td>Biomedical Physiology I</td>
<td></td>
</tr>
<tr>
<td>BIOL 388</td>
<td>Principles of Animal Physiology</td>
<td></td>
</tr>
<tr>
<td>Field experience</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WFSC 300/ENTO 300</td>
<td>Field Studies</td>
<td></td>
</tr>
<tr>
<td>WFSC 484</td>
<td>Internship</td>
<td></td>
</tr>
<tr>
<td>WFSC 485</td>
<td>Directed Studies</td>
<td></td>
</tr>
<tr>
<td>WFSC 491</td>
<td>Research</td>
<td></td>
</tr>
</tbody>
</table>

**Vertebrate Zoology Option**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BICH 303</td>
<td>Elements of Biological Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>or BICH 410</td>
<td>or Comprehensive Biochemistry I</td>
<td>3</td>
</tr>
</tbody>
</table>

**CHEM 102**  
& **CHEM 112**  
& **CHEM 228**  
& **CHEM 238**  
**PHYS 202**  
**Biology of Insects**  
**WFSC 311**  
**WFSC 315**  
**WFSC 401**  
**WFSC 402**  
**ENTO 313**

**Directed electives**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 102</td>
<td>Fundamentals of Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 112</td>
<td>and Fundamentals of Chemistry Laboratory II</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 228</td>
<td>Organic Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>&amp; CHEM 238</td>
<td>and Organic Chemistry Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 202</td>
<td>College Physics</td>
<td>4</td>
</tr>
<tr>
<td>Biodiversity electives</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Select two of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WFSC 311</td>
<td>Ichthyology</td>
<td></td>
</tr>
<tr>
<td>WFSC 315</td>
<td>Herpetology</td>
<td></td>
</tr>
<tr>
<td>WFSC 401</td>
<td>General Mammalogy</td>
<td></td>
</tr>
<tr>
<td>WFSC 402</td>
<td>General Ornithology</td>
<td></td>
</tr>
<tr>
<td>ENTO 313</td>
<td>Biology of Insects</td>
<td></td>
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</tbody>
</table>

**University Core Curriculum**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 112</td>
<td>Introductory Biology II</td>
<td>4</td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>MATH 131</td>
<td>Mathematical Concepts—Calculus</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 142</td>
<td>or Business Mathematics II</td>
<td>1</td>
</tr>
<tr>
<td>PHIL 240</td>
<td>Introduction to Logic</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 141</td>
<td>or Business Mathematics I</td>
<td>1</td>
</tr>
<tr>
<td>RENR 215</td>
<td>Fundamentals of Ecology—Laboratory</td>
<td>1</td>
</tr>
</tbody>
</table>

**American history electives** (p. 23)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creative arts elective</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

**Government/Political science electives** (p. 23)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language, philosophy and culture elective</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

**Social and behavioral science elective** (p. 23)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Semester Credit Hours</td>
<td></td>
<td>120</td>
</tr>
</tbody>
</table>

1 Students currently enrolled at Texas A&M who wish to transfer to the Wildlife and Fisheries Sciences major must have achieved a grade of C or higher in introductory biology and mathematics courses required in the University Core Curriculum. Enrollment in Wildlife and Fisheries Sciences (WFSC) option courses will be restricted to students who have achieved a grade of C or higher in prerequisite courses.

2 Directed electives to be chosen to meet prerequisite requirements for admission to professional schools.

3 The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement.

Students are required to make a C or better in all WFSC and RENR 205/RENR 215 courses.

A total of 120 semester hours will be required for a BS degree.

**Wildlife and Fisheries Sciences - BS, Wildlife Ecology and Conservation Option**

Graduates are well equipped for post-baccalaureate study in many life science fields (graduate school programs and human and veterinary
(or for direct entry into professions such as wildlife management, fisheries management, environmental impact assessment, aquaculture, natural history museum education, zoological park collection management, public school teaching and urban wildlife management. Employers of recent graduates include state and federal resource agencies, scientific foundations, ranches, hunting and fishing clubs, fish farms, environmental consulting firms, museums and secondary schools.

Wildlife ecology, aquatic ecology, and vertebrate zoology curriculum options lead to the Bachelor of Science degree. At the end of the sophomore year, and after consultation with his or her advisor, each student will choose a course of study from among the options within the department's curricula. The chosen option is enhanced by a common departmental “core” of courses necessary for a sound education in the wildlife and fisheries conservation professions.

Students are encouraged to develop an emphasis area within their degree option. To build this emphasis area, students will choose directed electives, from related disciplines, in consultation with their academic advisor and faculty members.

Wildlife Ecology and Conservation Option

This option is designed for students interested in the research, management and conservation of wildlife and its ecosystems. This option provides considerable flexibility when designing a degree program and allows students to focus on both terrestrial and aquatic conservation management. Job opportunities are available with state and federal agencies; private land management individuals and companies; state, national and international organizations; environmental consulting firms; and as private consultants. Emphasis areas in this option include:

**Wildlife Ecology Emphasis**

The wildlife ecology emphasis is for students interested in research and management of terrestrial animals and ecosystems, including game, non-game, and endangered species. The ability to be certified is becoming increasingly important for employment. Courses taken meet course certification requirements of The Wildlife Society.

**Wildlife and Fisheries Management Emphasis**

This emphasis is for students interested in research and management of both aquatic and terrestrial habitats. Courses taken meet course certification requirements of both the American Fisheries Society and The Wildlife Society. The ability to be certified is becoming increasingly important for employment.

**Conservation Biology Emphasis**

This emphasis is for students interested in biodiversity and its conservation. This emphasis allows the student to focus on various aspects including urban and/or wetland conservation.

**Program Requirements**

**Wildlife and Fisheries Sciences Core Courses**

- CHEM 101 Fundamentals of Chemistry I: 4
- CHEM 111 & Fundamentals of Chemistry Laboratory I: 4
- CHEM 222 Elements of Organic and Biological Chemistry: 3
- CHEM 242 Elementary Organic Chemistry Laboratory: 1
- ENGL 210 Technical and Business Writing: 3
- GENE 301 Comprehensive Genetics: 4
- GENE 312 & Comprehensive Genetics Laboratory: 4
- PHYS 201 College Physics: 4
- RENR 205 Fundamentals of Ecology: 3
- STAT 302 Statistical Methods: 3
- WFSC 101 Introduction to Wildlife and Fisheries: 1
- WFSC 302 Natural History of the Vertebrates: 3
- WFSC 304 Wildlife and Fisheries Conservation: 3
- Choose 1 Physiology course: 4
- WFSC 335 Natural History of the Invertebrates: 3
- BIOL 388 Principles of Animal Invertebrates: 3
- VTPP 423 Biomedical Physiology I: 3
- Field experience: 3
- Select one of the following:
  - WFSC Field Studies: 300
  - WFSC 484 Internship: 300
  - WFSC 485 Directed Studies: 
  - WFSC 491 Research:

**Wildlife Ecology and Conservation Option**

Biodiversity electives: 6
- Select two of the following:
  - ENTO 313 Biology of Insects: 3
  - WFSC 315 Herpetology: 3
  - WFSC 401 General Mammalogy: 3
  - WFSC 402 General Ornithology: 3
- Earth science elective: 4
  - Select one of the following:
    - SCSC 301 Soil Science: 3
    - GEOL 101 Principles of Geology: 3
    - OCN 251 Oceanography: 3
    - & OCN 252 Oceanography Laboratory: 3
- Policy elective: 3
  - Select one of the following:
    - WFSC 303 Fish and Wildlife Laws and Administration: 3
    - RENR 470 Environmental Impact Assessment: 3
    - RENR 375 Conservation of Natural Resources: 3
    - ESSM 406 Natural Resources Policy: 3

**Directed electives**: 26

**University Core Curriculum**

- BIOL 111 Introductory Biology I: 4
- BIOL 112 Introductory Biology II: 4
- COMM 203 Public Speaking: 3
- ENGL 104 Composition and Rhetoric: 3
- MATH 131 Mathematical Concepts—Calculus: 3
- or MATH 142 or Business Mathematics II: 3
- or MATH 141 or Business Mathematics I: 3
- PHIL 240 Introduction to Logic: 3
- or RENR 215 Fundamentals of Ecology—Laboratory: 1
- American history electives (p. 23): 6
- Creative arts elective (p. 22): 3
- Government/Political science electives (p. 23): 6
| Language, philosophy and culture elective (p. 21) | 3 |
| Social and behavioral science elective (p. 23) | 3 |
| **Total Semester Credit Hours** | **120** |

1. Students currently enrolled at Texas A&M who wish to transfer to a Wildlife and Fisheries Sciences major must have achieved a grade of C or higher in introductory biology and mathematics courses required in the University Core Curriculum. Enrollment in Wildlife and Fisheries Sciences (WFSC) option courses will be restricted to students who have achieved a grade of C or higher in prerequisite courses.

2. Directed electives to be chosen in areas related to wildlife management, conservation or animal behavior.

3. The Graduation requirements include a requirement for 6 hours of international and cultural diversity courses. A course satisfying a Core category, a college/department requirement, or a free elective can be used to satisfy this requirement.

Students are required to make a C or better in all WFSC and RENR 205/RENR 215 courses.

A total of 120 semester hours will be required for a BS degree.

**Wildlife and Fisheries Sciences - Minor**

The Department of Wildlife and Fisheries Sciences offers a minor in Wildlife and Fisheries Sciences.

Graduates with a minor are going to take courses centered on wildlife management, fisheries management, habitat management, and differences among the different types of wildlife. Students will get an exposure to both terrestrial and aquatic wildlife and habitats.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>WFSC 302</td>
<td>Natural History of the Vertebrates</td>
<td>3</td>
</tr>
<tr>
<td>WFSC 304</td>
<td>Wildlife and Fisheries Conservation</td>
<td>3</td>
</tr>
<tr>
<td>WFSC 403</td>
<td>Animal Ecology</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>WFSC 311</td>
<td>Ichthyology (*)</td>
<td></td>
</tr>
<tr>
<td>WFSC 401</td>
<td>General Mammalogy</td>
<td></td>
</tr>
<tr>
<td>WFSC 402</td>
<td>General Ornithology</td>
<td></td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>WFSC 405</td>
<td>Urban Wildlife and Fisheries</td>
<td></td>
</tr>
<tr>
<td>WFSC 406</td>
<td>Conservation Biology and Wildlife Habitat Management</td>
<td></td>
</tr>
<tr>
<td>WFSC 410</td>
<td>Principles of Fisheries Management (*)</td>
<td></td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>WFSC 408</td>
<td>Techniques of Wildlife Management</td>
<td></td>
</tr>
<tr>
<td>WFSC 417</td>
<td>Biology of Fishes (*)</td>
<td></td>
</tr>
</tbody>
</table>

(*)- Aquatic courses

**Total Semester Credit Hours** | **18**

Students must choose at least one terrestrial and one aquatic course.
College of Architecture

Administrative Officers
Dean - Jorge A. Vanegas, Ph.D.
Executive Associate Dean - Louis G. Tassinary, J.D., Ph.D.
Associate Dean for Outreach and Diversity - Cecilia Guisti, Ph.D.
Assistant Dean for Academic Affairs - Leslie H. Feigenbaum, M.S.
Assistant Dean for International Programs - Elton Abbott, D.E.D.

General Statement
The College of Architecture offers undergraduate and graduate professional programs to prepare individuals to enter the professions of architecture, landscape architecture, construction management, urban and regional planning and visualization. The planning, design and construction of the world’s buildings, cities and landscapes involve a variety of professional skills. The faculty of architects, urban planners, landscape architects, engineers, computer scientists, constructors, lawyers, historians and artists, in collaboration with educators in the language, philosophy and culture and natural and social sciences, help students develop an understanding of the physical, social, economic and political forces that shape our environment.

Undergraduate degree programs are offered in landscape architecture, construction science, environmental design architectural studies, visualization and urban and regional planning. Minors in art and architectural history; global art, design and construction; and sustainable architecture and planning are offered through the Department of Architecture. A minor in urban and regional planning is offered through the Department of Landscape Architecture and Urban Planning. A minor in facility management is offered through the Department of Construction Science. A minor in art is offered through the Department of Visualization. Master’s degree programs are offered in architecture, landscape architecture, urban planning, land and property development, construction management, fine arts and visualization. Doctor of Philosophy degrees are offered in architecture and urban and regional sciences.

Personal Computers
Because of the important role of computing in the disciplines housed within the College of Architecture, all entering students are required to possess a portable, network-ready personal computer capable of running software appropriate to their academic program. Financial aid is available to assist students in their computer purchases. No student will be denied admission to Texas A&M University based on an inability to purchase a computer. Additional information is available on the College of Architecture (http://www.arch.tamu.edu) website or the Department of Visualization (http://viz.arch.tamu.edu) website for Visualization students.

Enrollment Management Policy
Students that are admitted into the College of Architecture enter with a lower level classification in Construction Science (p. 196) (COSL), Environmental Design Architectural Studies (p. 191) (EDAL), Landscape Architecture (p. 199) (LANL), Urban and Regional Planning (p. 199) or Visualization (p. 204) (VISL). All students must comply with the guidelines in terms of coursework and process to be considered for upper level. Until students are accepted into upper level they are prohibited from taking 300 and 400 level courses in their major.

Admission will be effective upon successful completion of in-progress courses. If all requirements are not met prior to the start of the following semester, admission will not be granted and registration in all upper level coursework in the College of Architecture will be cancelled. Admission is not guaranteed. If there are more qualified applicants than there is space available, preference will be given to students based on their academic achievement.

Transfer Students
Transfer students, who meet the University entrance requirements and who desire to enter a major field of study in the College of Architecture, will be admitted based on available space and current College of Architecture entrance criteria. Following admission, all transfer students are placed on a 2.5 GPR probation for a minimum of 12 credit hours to substantiate competency in required lower-level courses. Transfer students will be admitted into the college with a lower-level classification and may apply for upper-level status after at least one semester at Texas A&M University.

Transfer students accepted into the Bachelor of Environmental Design degree program must submit a portfolio to the Department of Architecture to receive credit for drawing and design studio classes taken at another university or college, unless the course is listed as an equivalent under the Texas common course numbering system. The review of the portfolio will ensure appropriate studio placement. Additional information may be found on the Department of Architecture (http://dept.arch.tamu.edu/undergraduate/prospective-students) website.

Change of Major
Students currently enrolled in another major at Texas A&M University with fewer than 60 hours who desire to change their major field of study into the College of Architecture must fill out a Change of Curriculum application. Deadlines for applications are as follows:

- March 1 for summer admittance (for Construction Science, Environmental Design Architectural Studies, Landscape Architecture, Urban and Regional Planning, Visualization and University Studies students)
- June 15 for fall admittance (for Construction Science, Environmental Design Architectural Studies, Urban and Regional Planning, Visualization and University Studies students)
- October 1 for spring admittance (for Construction Science, Urban and Regional Planning, Visualization and University Studies students)

Students will be notified of action on their applications within 30 days of the deadline date. The college will admit the best-qualified applicants based on the number of spaces available in their program of choice.

Semester Away
The College of Architecture requires all upper-level undergraduate students to spend one semester studying abroad or at another university, or in a professional internship. Specific information on these programs is available through each department or the Texas A&M Study Abroad Office.
Academic Policies

For Construction Science, Environmental Design Architectural Studies, Landscape Architecture, Urban Planning and Visualization Majors: Students must make a grade of C or better in every College of Architecture course (ARCH, ARTS, CARC, COSC, ENDS, LAND, LDEV, URPN, VIST) used to satisfy degree requirements. Students must also make a grade of C or better in any course used as an equivalent substitution for College of Architecture courses that satisfy degree requirements.

Majors

College of Architecture

- Bachelor of Science in University Studies, Global Arts, Planning, Design and Construction Concentration (p. 204)

Department of Architecture

- Bachelor of Environmental Design in Environmental Design Architectural Studies (p. 194)

Department of Construction Science

- Bachelor of Science in Construction Science (p. 198)

Department of Landscape Architecture and Urban Planning

- Bachelor of Science in Urban and Regional Planning (p. 202)

Department of Visualization

- Bachelor of Science in Visualization (p. 206)

Minors

College of Architecture

- Global Culture and Society Minor (p. 196)

Department of Architecture

- Art and Architectural History Minor (p. 195)
- Global Art, Design and Construction Minor (p. 195)
- Sustainable Architecture and Planning Minor (p. 196)

Department of Construction Science

- Facility Management Minor (p. 199)

Department of Landscape Architecture and Urban Planning

- Urban and Regional Planning Minor (p. 203)

Department of Visualization

- Art Minor, New Media Emphasis or Traditional Media Emphasis (p. 206)

Certificates

- Diversity Program - Certificate (p. 207)

Masters

Department of Architecture

- Master of Science in Architecture (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/architecture/architecture/ms)
- Master of Architecture in Architecture (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/architecture/architecture/march)

Department of Construction Science

- Master of Science in Construction Management (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/architecture/construction-science/ms)

Department of Landscape Architecture and Urban Planning

- Master of Landscape Architecture in Landscape Architecture (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/architecture/landscape-architecture-urban-planning/mla)
- Master of Land and Property Development in Land and Property Development (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/architecture/landscape-architecture-urban-planning/land-property-development-masters)
- Master of Urban Planning in Urban and Regional Planning (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/architecture/landscape-architecture-urban-planning/ms-urban-planning)

Department of Visualization

- Master of Science in Visualization (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/architecture/visualization/ms)
- Master of Fine Arts in Visualization (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/architecture/visualization/mfa)

Doctoral

Department of Architecture

- Doctor of Philosophy in Architecture (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/architecture/architecture/phd)

Department of Landscape Architecture and Urban Planning

- Doctor of Philosophy in Urban and Regional Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/architecture/landscape-architecture-urban-planning/urban-regional-science-phd)

Department of Architecture

The undergraduate curriculum in Environmental Design Architectural Studies at Texas A&M University is offered through the Department of Architecture. The four-year Bachelor of Environmental Design (BED) degree prepares students for challenging careers in industries supporting the built environments. The program produces graduates who are prepared to influence society with informed and visionary designs—designs that ensure sustainability by responding to cultural, social, economic and ecological factors.

Students interested in professional registration as an architect must complete a National Architectural Accreditation Board (NAAB) accredited
Master of Architecture program in addition to the four-year undergraduate Bachelor of Environmental Design degree.

Enrollment in Environmental Design Architectural Studies Program

1. Students must have satisfactorily completed at least 54 hours of coursework with a minimum GPR of 2.5 for those courses completed at Texas A&M University.
2. Students must satisfactorily complete the following courses as part of the 54 hours of coursework with a minimum of a 2.5 GPR to apply for upper level.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 205 Architecture Design I</td>
<td>4</td>
</tr>
<tr>
<td>ARCH 206 Architecture Design II</td>
<td>5</td>
</tr>
<tr>
<td>or ARCH 207 or Architecture Design II</td>
<td>5</td>
</tr>
<tr>
<td>ARCH 212 Social and Behavioral Factors in Design</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 249 Survey of World Architecture History I</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 250 Survey of World Architecture History II</td>
<td>3</td>
</tr>
<tr>
<td>ENDS 105 Design Foundations I</td>
<td>4</td>
</tr>
<tr>
<td>ENDS 106 Design Foundations II</td>
<td>4</td>
</tr>
<tr>
<td>ENDS 115 Design Communication Foundations</td>
<td>3</td>
</tr>
<tr>
<td>ENDS 116 Design Communication Foundations II</td>
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<tr>
<td>ENGL 104 Composition and Rhetoric</td>
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</table>

Select one of the following: 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 141 Business Mathematics I</td>
<td>1</td>
</tr>
<tr>
<td>&amp; MATH 142 Business Mathematics II</td>
<td>2</td>
</tr>
<tr>
<td>MATH 151 Engineering Mathematics I</td>
<td>1</td>
</tr>
<tr>
<td>&amp; MATH 152 Engineering Mathematics II</td>
<td>2</td>
</tr>
<tr>
<td>PHYS 201 College Physics</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 45

3. Students must apply to the upper level through the department. The application is to be submitted by the following date:
   - March 1 for Summer and Fall admission
4. Students applying for upper level must submit a portfolio that provides documentation of the applicant’s design representation and creative problem solving ability. Portfolios will be reviewed as evidence supporting design ability. Guidelines are outlined on the application form and in the Student Services office. Students will be admitted according to available space.

Preparation for Professional Studies in Architecture

Although the four-year BED degree at Texas A&M University is a pre-professional degree and is not accredited by the National Architectural Accrediting Board (NAAB), those who have completed this pre-professional degree can apply to an accredited Master of Architecture program, which is offered at Texas A&M University.

In the United States, most state architectural registration boards require, as the prerequisites for licensure, a degree from a National Architectural Accrediting Board (NAAB) accredited professional degree program, the fulfillment of the National Council of Architectural Registration Board’s (NCARB) Internship Development Program (IDP), and the successful completion of NCARB’s Architectural Licensing Examination (ARE). The NAAB, which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture (BArch), the Master of Architecture (MArch), and the Doctor of Architecture (DArch). Students should consult the Texas A&M Master of Architecture, NAAB and NCARB websites for additional information.

Transfer and Change of Major Students

Transfer and change of major students (students currently enrolled in another major at Texas A&M University) who are admitted to the Department of Architecture are classified as lower level (EDAL). Transfer students who meet all the criteria for admittance to upper-level studies may immediately apply for admittance to upper level.

Transfer students who have completed at least 24 graded transferable hours, and change of major students who have completed at least 12 graded transferable hours are encouraged to participate in a 10-week summer module offered by the Department of Architecture. The summer module is designed to provide an intensive first-year design studio sequence along with support coursework that will enable change of major and transfer students to qualify for sophomore design studios the following semester. This summer module can enable Transfer and Change of Major students to complete the four-year degree in a more efficient and timely manner.

Transfer students accepted into the Bachelor of Environmental Design degree program must submit a portfolio to the Department of Architecture to receive credit for drawing and design studio classes taken at another university or college, unless the course is listed as an equivalent under the Texas common course numbering system. The review of the portfolio will ensure appropriate studio placement. Additional information may be found on the Department of Architecture website.

Faculty

Adams, Harold L, Visiting Professor
Architecture
BAR, Texas A&M University, 2014

Altani, Koichiro, Associate Professor
Architecture
MAR, Virginia Polytechnic Institute and State University, 1997

Ali, Ahmed K, Assistant Professor
Architecture
PhD, Virginia Polytechnic Institute and State University, 2012

Babe, John C, Assistant Professor Of The Practice
Architecture
PhD, University of Toronto, 1989

Baltazar, Juan Carlos, Tees Research Engineer
Architecture
PhD, Texas A&M University, 2006

Beltran, Liliana O, Associate Professor
Architecture
PhD, University of California, Berkeley, 1997

Borhani Haghighi, Alireza, Lecturer
Architecture
MA, Virginia Tech, 2012
Caffey, Stephen M, Assistant Professor
Architecture
PhD, University of Texas, 2008

Campagnol, Gabriela, Assistant Professor
Architecture
PhD, University of Sao Paulo, 2003

Clayton, Mark J, Professor
Architecture
PhD, Stanford University, 1998
MAR, University of California-Los Angeles, 1987

Culp, Charles H, Professor
Architecture
PhD, Iowa State University, 1976

Deyong, Sarah J, Associate Professor
Architecture
PhD, Princeton University, 2008

Erminy Castillo, Marcel, Senior Lecturer
Architecture
PhD, Central University of Venezuela, 1987

Esquivel, Jose G, Associate Professor
Architecture
MAR, Ohio State University, 1988

Geva, Anat M, Professor
Architecture
PhD, Texas A&M University, 1995

Gibbs, Brian C, Visiting Lecturer
Architecture
MAR, Texas A&M University, 2006

Glowacki, Kevin T, Associate Professor
Architecture
PhD, Bryn Mawr College, 1991

Graham, Rene E, Visiting Lecturer
Architecture
MA, Rice University, 2010

Habert, Jeff, Professor
Architecture
PhD, University of Colorado, 1986

Haliburton, James T, Lecturer
Architecture
MAR, Texas A&M University, 2014

Hamilton, Daniel K, Professor
Architecture
MS, Pepperdine University, 2003

Hill, Rodney C, Professor
Architecture
MAR, University of California, Berkeley, 1969

Holliday, Ray W, Assistant Professor Of The Practice
Architecture
MLA, Texas A&M University, 2000
MAR, Texas A&M University, 1992

Holliday, Shelley D, Senior Lecturer
Architecture
MEN, Texas A&M University, 2001

Kantar Mehrjardi, Negar, Assistant Professor
Architecture
MS, Virginia Tech, 2014
MAR, Shahid Beheshti University, 2005

Klein, Nancy L, Associate Professor
Architecture
PhD, Bryn Mawr College, 1991

Lu, Zhipeng, Lecturer
Architecture
PhD, Texas A&M University, 2009

Maffei, Gerald L, Visiting Professor
Architecture
MAR, University of California, Berkeley, 1969

Mann, George J, Professor
Architecture
MS, Columbia University, 1962

Miranda, Valerian, Associate Professor
Architecture
PhD, Texas A&M University, 1988

Nichols, Anne B, Associate Professor Of The Practice
Architecture
PhD, University of Illinois, 2000

Obrien, Michael J, Professor
Architecture
MAR, Virginia Polytechnic Institute and State University, 1982
MS, Virginia Tech, 1982

Rodiek, Susan D, Associate Professor
Architecture
PhD, Cardiff University, 2004

Rogers, Julia S, Senior Lecturer
Architecture
PhD, Texas A&M University, 1996

Schiffhauer, Robert J, Associate Professor
Architecture
MFA, Yale University, 1965
MS, Yale School of Art, 1965

Tabb, Phillip J, Professor
Architecture
PhD, Architectural Association Graduate School of Architecture, 1990

Vanegas, Jorge A, Professor
Architecture
PhD, Stanford University, 1988

Warden, Robert R, Professor
Architecture
MA, University of New Mexico, 1994
MS, University of New Mexico, 1994
MAR, Texas A&M University, 1986
Wells, Ward V, Professor
Architecture
PhD, University of Oklahoma, 1976

Yan, Wei, Associate Professor
Architecture
PhD, University of California, Berkeley, 2005

Zhu, Xuemei, Associate Professor
Architecture
PhD, Texas A&M University, 2008

**Majors**
- Bachelor of Environmental Design in Environmental Design Architectural Studies (p. 194)

**Minors**
- Art and Architectural History Minor (p. 195)
- Global Art, Design and Construction Minor (p. 195)
- Sustainable Architecture and Planning Minor (p. 196)

### Environmental Design Architectural Studies - BED

The degree in Environmental Design Architectural Studies requires study in the arts, humanities and sciences. The curriculum fosters creativity and problem-solving skills while providing a solid foundation in design, theory, architectural history, building and technology. Coursework encourages multidisciplinary and comparative perspectives that allow opportunities for communication and team-oriented methods of production. Global perspectives are encouraged by a mandatory semester-long study away experience that includes study abroad or internship opportunities.

Students develop skills and acquire knowledge through a studio-based experience with a variety of proposed or actual design-related projects. The studio projects place a shared emphasis on the technical and expressive content of design work; the processes by which student’s research, synthesize and document their design ideas; and the creation of tangible products that achieve a high quality of graphic and physical craft.

### Program Requirements

**Environmental Design Architectural Studies Curriculum**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 205</td>
<td>Architecture Design I</td>
<td>4</td>
</tr>
<tr>
<td>ARCH 206</td>
<td>Architecture Design II</td>
<td>5</td>
</tr>
<tr>
<td>or ARCH 207</td>
<td>Architecture Design II</td>
<td></td>
</tr>
<tr>
<td>ARCH 249</td>
<td>Survey of World Architecture History I</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 305</td>
<td>Architectural Design III</td>
<td>5</td>
</tr>
<tr>
<td>ARCH 330</td>
<td>The Making of Architecture</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 331</td>
<td>Architectural Structures</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 335</td>
<td>Architectural Systems</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 350</td>
<td>History and Theory of Modern and Contemporary Architecture</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 405</td>
<td>Architectural Design IV</td>
<td>5</td>
</tr>
<tr>
<td>ARCH 406</td>
<td>Architecture Design V</td>
<td>5</td>
</tr>
<tr>
<td>ARCH 431</td>
<td>Integrated Structures</td>
<td>2</td>
</tr>
<tr>
<td>ARCH 435</td>
<td>Integrated Systems</td>
<td>2</td>
</tr>
<tr>
<td>ENDS 105</td>
<td>Design Foundations I</td>
<td>4</td>
</tr>
</tbody>
</table>

**Study Away**

Select one of the following:

**Option 1:**
- CARC 301 Field Studies in Design Innovation
- Study Away elective
- Study Away elective

**Option 2:**
- ARCH 494 Internship
- Study Away elective

**Directed electives**
- 6

**General elective**
- 3

**University Core Curriculum**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 212</td>
<td>Social and Behavioral Factors in Design</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 213</td>
<td>Sustainable Architecture</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 250</td>
<td>Survey of World Architecture History II</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Communication (p. 20)</td>
<td></td>
</tr>
<tr>
<td>MATH 141</td>
<td>Business Mathematics I</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 152</td>
<td>Engineering Mathematics II</td>
<td></td>
</tr>
<tr>
<td>MATH 142</td>
<td>Business Mathematics II</td>
<td></td>
</tr>
<tr>
<td>or MATH 151</td>
<td>Engineering Mathematics I</td>
<td></td>
</tr>
<tr>
<td>PHYS 201</td>
<td>College Physics</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Life and physical sciences (except PHYS 201) (p. 20)</td>
<td>5</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours**
- 120

1. Study Away electives will be selected with approval of the Assistant Dean for International Programs & Initiatives.
2. Directed Electives are to be selected from an approved list; see the Department of Architecture Undergraduate Advisor (in Langford ARCA 219).
3. Select from any 100-499 course not used elsewhere (except MATH 100-103 (p. 860) and MATH 150).
4. Courses pertaining to solely Texas history may not comprise more than 3 hours of the American History core curriculum requirement.

All proposals for undergraduate independent study must be signed by the supervising faculty and submitted to the department for approval; forms are available from the Department of Architecture Undergraduate Advisor (in Langford ARCA 219) and on the department website.

A grade of C or better must be made in all College of Architecture courses (ARCH, ARTS, COSC, CARC, ENDS, LAND, LDEV, URPN, and VIST). Students must also make a grade of C or better in any course used as an equivalent substitution for College of Architecture courses satisfying degree requirements.
Art and Architecture History - Minor

The Minor in Art and Architecture History provides undergraduate students with an interdisciplinary, global, and multicultural approach to understanding visual arts and the built environment. The curriculum emphasizes an awareness of diverse global cultures and historical traditions, an appreciation of context, visual understanding, and critical thinking. The Minor in Art and Architectural History can serve as a complement to several major fields of study and is open to all Texas A&M undergraduates. The structure of the minor encourages students to gain a broad chronological understanding of art and architectural history before advancing to specialized areas of interest. Coursework includes six credit hours at the introductory level (100- and 200-level courses) and nine credit hours in specialized subjects at an advanced level (300- and 400-level courses) for a total of 15 credit hours.

The application form can be found on the Department of Architecture's website. Per university guidelines, the student's home college/department is responsible for advising students pursuing the Minor in Art and Architecture History.

Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTS 149</td>
<td>Art History Survey I</td>
<td>3</td>
</tr>
<tr>
<td>or ARCH 249</td>
<td>Survey of World Architecture History I</td>
<td>3</td>
</tr>
<tr>
<td>ARTS 150</td>
<td>Art History Survey II</td>
<td>3</td>
</tr>
<tr>
<td>or ARCH 250</td>
<td>Survey of World Architecture History II</td>
<td>3</td>
</tr>
</tbody>
</table>

Select nine hours from the following: 1,2,3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTH 353</td>
<td>Archaeology of Ancient Greece</td>
<td></td>
</tr>
<tr>
<td>CLAS 353</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANTH 354</td>
<td>Archaeology of Ancient Italy</td>
<td></td>
</tr>
<tr>
<td>CLAS 354</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARCH 345</td>
<td>History of Building Technology</td>
<td></td>
</tr>
<tr>
<td>ARCH 350</td>
<td>History and Theory of Modern and Contemporary Architecture</td>
<td></td>
</tr>
<tr>
<td>ARCH 430</td>
<td>History of Ancient Architecture</td>
<td></td>
</tr>
<tr>
<td>ARCH 434</td>
<td>The Role of Sculpture and Painting in Ancient Architecture</td>
<td></td>
</tr>
<tr>
<td>ARCH 437</td>
<td>Great Medieval Cathedrals</td>
<td></td>
</tr>
<tr>
<td>ARCH 438</td>
<td>History and Design of Sacred Architecture</td>
<td></td>
</tr>
<tr>
<td>ARCH 441</td>
<td>Baroque and Rococo Architecture</td>
<td></td>
</tr>
<tr>
<td>ARCH 443</td>
<td>Aegean Art and Architecture</td>
<td></td>
</tr>
<tr>
<td>ARCH 489</td>
<td>Special Topics in... &amp; ARTS and Special Topics in... (Art and Architectural History)</td>
<td></td>
</tr>
<tr>
<td>ARTS 330</td>
<td>The Arts of America</td>
<td></td>
</tr>
<tr>
<td>ARTS 349</td>
<td>The History of Modern Art</td>
<td></td>
</tr>
<tr>
<td>ARTS 350</td>
<td>The Arts and Civilization</td>
<td></td>
</tr>
<tr>
<td>CLAS 353</td>
<td>Archaeology of Ancient Greece</td>
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<tr>
<td>CLAS 354</td>
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<tr>
<td>ANTH 354</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LAND 240</td>
<td>History of Landscape Architecture</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours: 15

Global Art Design and Construction - Minor

The Minor in Global Art, Design and Construction is designed for students in the College of Architecture and other colleges to officially record they have taken courses in an international environment.

Program Requirements

Select six hours from the following: 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 249</td>
<td>Survey of World Architecture History I</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 250</td>
<td>Survey of World Architecture History II</td>
<td>3</td>
</tr>
<tr>
<td>ARCH 345</td>
<td>History of Building Technology</td>
<td></td>
</tr>
<tr>
<td>ARCH 350</td>
<td>History and Theory of Modern and Contemporary Architecture</td>
<td></td>
</tr>
<tr>
<td>ARTS 149</td>
<td>Art History Survey I</td>
<td>3</td>
</tr>
<tr>
<td>ARTS 150</td>
<td>Art History Survey II</td>
<td>3</td>
</tr>
<tr>
<td>LAND 240</td>
<td>History of Landscape Architecture</td>
<td></td>
</tr>
</tbody>
</table>

Select six hours from the following: 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 345</td>
<td>History of Building Technology</td>
<td></td>
</tr>
<tr>
<td>ARCH 430</td>
<td>History of Ancient Architecture</td>
<td></td>
</tr>
<tr>
<td>ARCH 434</td>
<td>The Role of Sculpture and Painting in Ancient Architecture</td>
<td></td>
</tr>
<tr>
<td>ARCH 437</td>
<td>Great Medieval Cathedrals</td>
<td></td>
</tr>
<tr>
<td>ARCH 441</td>
<td>Baroque and Rococo Architecture</td>
<td></td>
</tr>
<tr>
<td>ARTS 329</td>
<td>Texas Art History</td>
<td></td>
</tr>
<tr>
<td>ARTS 330</td>
<td>The Arts of America</td>
<td></td>
</tr>
<tr>
<td>ARTS 335</td>
<td>The Art and Architecture of Rome</td>
<td></td>
</tr>
<tr>
<td>ARTS 349</td>
<td>The History of Modern Art</td>
<td></td>
</tr>
<tr>
<td>ARTS 445</td>
<td>Byzantine Art and Architecture</td>
<td></td>
</tr>
<tr>
<td>LAND 340</td>
<td>Development of Landscape Architecture in North America</td>
<td></td>
</tr>
<tr>
<td>URPN 460</td>
<td>Sustainable Communities</td>
<td></td>
</tr>
</tbody>
</table>

International Component

Select six hours from the following: 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 484</td>
<td>Summer Internship</td>
<td>1</td>
</tr>
<tr>
<td>ARCH 494</td>
<td>Internship</td>
<td>1</td>
</tr>
<tr>
<td>ARTS 212</td>
<td>Life Drawing</td>
<td>2</td>
</tr>
<tr>
<td>ARTS 305</td>
<td>Painting I</td>
<td>2</td>
</tr>
</tbody>
</table>
ARTS 308  Sculpture  
ARTS 311  Black and White Photography  
ARTS 312  Advanced Photography  
ARTS 350  The Arts and Civilization  
CARC 301  Field Studies in Design Innovation  
CARC 311  Field Studies in Design Communication  
CARC 331  Field Studies in Design Philosophy  
COSC 484  Summer Internship  
COSC 494  Internship  

Total Semester Credit Hours  18

1  Must be taken as international internship.
2  Must be taken as international studio.

Students must make a grade of C or better.

**Global Culture and Society - Minor**

The Global Culture and Society minor will combine a study abroad experience at a single Texas A&M University-affiliated facility abroad with the completion of an interdisciplinary undergraduate minor on a theme appropriate for the center that can be completed in one semester.

**Program Requirements**

Portfolio  
Select one of the following:  
- ARCH 250  Survey of World Architecture History II  
- ANTH 210  Social and Cultural Anthropology  
- GEOG 202  Geography of the Global Village  

Select one of the following:  
- ARTS 350  The Arts and Civilization  
- CARC 311  Field Studies in Design Communication  
- CARC 331  Field Studies in Design Philosophy  
- HIST 362  History of Science  
- Other Courses approved by student’s college  

Total Semester Credit Hours  16

Students must make a grade of C or better.

1  Portfolio in global culture and society. May be completed either during the long semester abroad or upon return to College Station.
2  Must be taken in a single fall or spring semester at a TAMU-affiliated facility such as Santa Chiara or Soltis Center.

**Sustainable Architecture and Planning - Minor**

The Minor in Sustainable Architecture and Planning (SARP) provides undergraduate students with a multidisciplinary approach to understanding sustainability of the built environment. The curriculum emphasizes an awareness of responsible practices at a variety of scales impacting the built environment: buildings, communities, architectural systems, global resource management, and social equity. Students will become aware of responsible architectural design and develop critical thinking skills to address the multifaceted issues facing the profession today.

The Minor in Sustainable Architecture and Planning can serve as a complement to several major fields of study and is open to all Texas A&M undergraduates. The structure of the minor encourages students to gain a broad understanding before advancing to specialized areas of interest. Coursework includes six credit hours at the introductory level (100- and 200-level courses) and nine credit hours in specialized subjects, three of which must be at an advanced level (300- and 400-level courses) for a minimum total of 15 credit hours. Per University guidelines, the student's home college/department is responsible for advising students pursuing the Minor in Sustainable Architecture and Planning.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 213</td>
<td>Sustainable Architecture</td>
<td>3</td>
</tr>
<tr>
<td>URPN 460</td>
<td>Sustainable Communities</td>
<td>3</td>
</tr>
<tr>
<td>Select three courses from the following:</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>ARCH 421</td>
<td>Energy and Sustainable Architecture</td>
<td></td>
</tr>
<tr>
<td>ARCH 446</td>
<td>Foundations of Historic Preservation</td>
<td></td>
</tr>
<tr>
<td>ENGR 101</td>
<td>Energy: Resources, Utilization and Importance to Society</td>
<td></td>
</tr>
<tr>
<td>GEOG 202</td>
<td>Geography of the Global Village</td>
<td></td>
</tr>
<tr>
<td>GEOG 306</td>
<td>Introduction to Urban Geography</td>
<td></td>
</tr>
<tr>
<td>GEOG 330</td>
<td>Resources and the Environment</td>
<td></td>
</tr>
<tr>
<td>PHIL 205</td>
<td>Technology and Human Values</td>
<td></td>
</tr>
<tr>
<td>URPN 202</td>
<td>Building Better Cities</td>
<td></td>
</tr>
<tr>
<td>URPN 361</td>
<td>Urban Issues</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours  15

1  At least three of the nine hours must be at the 300-400 level. Six of the nine hours may be in coursework taken outside of the College of Architecture.
2  BED majors may not use directed electives to satisfy both the minor and graduation requirements. USAR majors may not use coursework to satisfy both the minor and the concentration area.
3  Students must complete a minimum of 6 hours in residence at the 300-400 level.

Students must make a grade of "C" or better in all courses.

**Department of Construction Science**

The construction industry is the largest industry in the nation with more than 7.7 million employees who annually produce more than 5 percent of the nation's Gross Domestic Product. Managing the construction process requires a broad understanding of the principles of construction science as well as leadership skills in motivating teams and integrating a wide range of tasks to produce a completed project.

The primary mission of the Department of Construction Science is to prepare students for successful careers and future leadership roles in construction and construction-related industries. The program integrates principles of architecture, technology, engineering, business and project management preparing students to effectively manage the total construction process. Courses taught by the Department include construction materials and methods, fundamental design courses in soils...
and foundations, mechanical and electrical systems and structures, project control systems and management, construction law, labor and contracts, and industry emphasis courses. In addition, related courses from other colleges are included to ensure a broad base of knowledge in business, engineering and construction fundamentals.

**Enrollment in Construction Science Program**

1. Students must have satisfactorily completed at least 54 hours of coursework with a minimum GPR of 2.5 for those courses completed at Texas A&M University.

2. Students must satisfactorily complete the following courses as part of the 54 hours of coursework with a minimum of a 2.5 GPR to be considered to upper level:

   **Construction Science**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 111</td>
<td>Fundamentals of Chemistry Laboratory I</td>
<td></td>
</tr>
<tr>
<td>or GEOL 101</td>
<td>Principles of Geology</td>
<td></td>
</tr>
<tr>
<td>or ENGR 101</td>
<td>Energy: Resources, Utilization and Importance to</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Society</td>
<td></td>
</tr>
<tr>
<td>COSC 175</td>
<td>Construction Graphics Communication</td>
<td>3</td>
</tr>
<tr>
<td>COSC 253</td>
<td>Construction Materials and Methods I</td>
<td>3</td>
</tr>
<tr>
<td>COSC 254</td>
<td>Construction Materials and Methods II</td>
<td>3</td>
</tr>
<tr>
<td>COSC 275</td>
<td>Estimating I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
<td></td>
</tr>
<tr>
<td>or COMM 203</td>
<td>or Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Business Mathematics I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 142</td>
<td>Business Mathematics II</td>
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</tr>
<tr>
<td>PHYS 201</td>
<td>College Physics</td>
<td>4</td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours** 32

3. Students must apply to the upper level through the department. The application is to be submitted the semester or summer session in which all of the above criteria are met.

   - March 1 for Summer admission
   - June 15 for Fall admission
   - October 1 for Spring admission

**Faculty**

Benham, James M, Visiting Lecturer
Construction Science
MS, Texas A&M University, 2014

Bigelow, Ben F, Assistant Professor
Construction Science
PhD, University of Colorado, 2012
MS, Arizona State University, 2008

Bilbo, David L, Professor
Construction Science
EdD, Texas A&M University, 1977

Bryant, John A, Associate Professor
Construction Science
PhD, Texas A&M University, 1995

Carlson, Kimberly A, Senior Lecturer
Construction Science
MAR, Texas A&M University, 2002

Choi, Kunhee, Assistant Professor
Construction Science
PhD, University of California, Berkeley, 2008

Choudhury, Iftekharudd, Associate Professor
Construction Science
PhD, Texas A&M University, 1994

Duff, Mike, Visiting Lecturer
Construction Science
MBA, Brigham Young University, 2007

Ellis, Debra R, Senior Lecturer
Construction Science
JD, Baylor University, 1993

Escamilla, Edelmiro E, Instructional Assistant Professor
Construction Science
PhD, Texas A&M University, 2011

Eustace, George N, Senior Lecturer
Construction Science
MA, Texas A&M University, 1977

Fernandez-Solis, Jose L, Associate Professor
Construction Science
PhD, Georgia Institute of Technology, 2006

Grisham, Ray F, Lecturer
Construction Science
JD, University of Texas, Austin, 1972

Haque, Mohammed E, Professor
Construction Science
PhD, New Jersey's Science & Technology University, 1995

Horlen, Joseph P, Associate Professor
Construction Science
JD, Baylor University, 1980

Kang, Ho-Yeong, Associate Professor
Construction Science
PhD, Texas A&M University, 2001

Lavy, Sarel, Associate Professor
Construction Science
PhD, Technion - Israel Institute of Technology, 2006

McGowan, Anne B, Instructional Professor
Construction Science
MS, Texas A&M University, 1977

Nichols, John M, Associate Professor
Construction Science
PhD, University of Newcastle, Australia, 2002
Program Requirements

Construction Business and Management
ACCT 209  Survey of Accounting Principles  3

Course Descriptions

ACCT 209  Survey of Accounting Principles  3
FINC 409  Survey of Finance Principles  3
MGMT 209  Business, Government and Society  3
MGMT 309  Survey of Management  3
MKTG 409  Principles of Marketing  3

Construction Science
COSC 175  Construction Graphics Communication  3
COSC 253  Construction Materials and Methods I  3
COSC 254  Construction Materials and Methods II  3
COSC 301  Construction Surveying  2
COSC 321  Structural Systems I  3
COSC 325  Mechanical, Electrical and Plumbing Systems in Construction I  3
COSC 326  Mechanical, Electrical and Plumbing Systems in Construction II  3
COSC 421  Soil and Structural Analysis  3

Construction
COSC 275  Estimating I  3
COSC 353  Construction Project Management  3
COSC 364  Construction Safety I  1
COSC 375  Estimating II  3
COSC 381  Professional Ethics in the Construction Industry  1
COSC 463  Introduction to Construction Law  3
COSC 465  Advanced Topics in Construction Law  3
COSC 475  Construction Project Planning  3
COSC 477  Construction Project Controls  3
COSC 494  Internship  7

Capstone
Select one of the following:  4

COSC 440  Interdisciplinary Capstone
COSC 441  Residential Capstone
COSC 442  Commercial Capstone
COSC 443  Industrial Capstone
COSC 446  Specialty Capstone

Technical Elective
Select one of the following:  3

COSC 450  Facility Management Principles and Practices
COSC 459  Industrial Construction
COSC 461  Building Information Modeling System
COSC 464  Construction Safety II
COSC 489  Special Topics in...
COSC 491  Research

Approved study abroad course

Mathematics
MATH 141  Business Mathematics I  3
MATH 142  Business Mathematics II  3

Life and physical sciences
PHYS 201  College Physics  4

Select one of the following:  4

CHEM 101  Fundamentals of Chemistry I
& CHEM 111  Fundamentals of Chemistry Laboratory I

GEOL 101  Principles of Geology
Life and physical sciences (p. 20) 1
General Education
COMM 203 Public Speaking 3
ENGL 104 Composition and Rhetoric 3
ENGL 210 Technical and Business Writing 3
POLS 206 American National Government 3
POLS 207 State and Local Government 3
American history (p. 23) 6
Creative arts and ICD 3
Select one of the following:
ARCH 249 Survey of World Architecture History I
ARCH 250 Survey of World Architecture History II
ARCH 350 History and Theory of Modern and Contemporary Architecture
ARTS 150 Art History Survey II
ENDS 101 Design Process
Language, philosophy and culture and ICD (p. 21) 3
Total Semester Credit Hours 120
A grade of C or better is required in all College of Architecture courses (ARCH, ARTS, CARC, COSC, ENDS, LAND, URPN and VIST) to satisfy Construction Science degree requirements.

Facility Management - Minor

The Department of Construction Science offers a minor in Facility Management. This minor will encompass multiple disciplines to ensure functionality of the built environment by integrating people, place, process and technology.

Program Requirements

COSC 450 Facility Management Principles and Practices 3
COSC 474 Facility Management Summer Internship 3
Select one of the following: 3
ACCT 209 Survey of Accounting Principles
ACCT 210 Survey of Managerial and Cost Accounting Principles
AGEC 422 Land Economics
FINC 409 Survey of Finance Principles
URPN 440 Urban and Regional Economic Development
Select one of the following: 3
ARCH 458 Cultural and Ethical Considerations for Global Practice
COMM 205 Communication for Technical Professions
COMM 315 Interpersonal Communication
COMM 324 Communication Leadership and Conflict Management
COSC 353 Construction Project Management
MGMT 309 Survey of Management
URPN 440 Urban and Regional Economic Development
Select one of the following: 3
ARCH 421 Energy and Sustainable Architecture
COSC 326 Mechanical, Electrical and Plumbing Systems in Construction II
COSC 353 Construction Project Management

URPN 330 Land Development I
URPN 469 Urban Infrastructure
Select one of the following: 3
COSC 461 Building Information Modeling System
GEOG 390 Principles of Geographic Information Systems
Total Semester Credit Hours 18
College of Architecture students can apply no more than six hours of coursework toward both the Facility Management Minor and their degree requirements.

At least two courses must be taken outside of the major area of study.

Must make a grade of C or better.

Department of Landscape Architecture and Urban Planning

Landscape Architecture

Landscape architecture is the profession providing landscape planning, design, and management services to enhance and protect natural and built environments. Landscape architecture as a discipline is devoted to understanding and managing the human and environmental forces that change the landscape. Landscape architects plan and design places for the health, safety, and welfare of citizens through systematic decision-making that integrates science, art, and technology. Individual and community quality of life are enhanced by a design process to improve, protect, and create ecologically sustainable, socially equitable, and economically feasible landscapes. Landscape architects work in urban, suburban and wilderness environments. Our graduates have gained distinction for projects as varied in scale as private gardens, residential communities, urban plazas, college campuses, park facilities and regional conservation plans.

The Bachelor in Landscape Architecture (BLA) program is nationally accredited as a professional degree program. The mission of the program is to prepare students to become professional landscape architects in private and public sector practice. Our educational goal is to produce graduates motivated to be leaders in the field and professionals who are intellectually active, broadly-educated citizens and life-long learners.

Urban and Regional Planning

The Bachelor of Science in Urban and Regional Planning degree program emphasizes the social, economic, cultural and natural factors that govern how communities and society are shaped. Coursework provides students with the knowledge and skills needed to develop solutions to community and regional growth and development issues that face our state and nation. Students have an opportunity to specialize in specific aspects of community and regional planning and development issues along with internship and service-learning experiences locally, nationally, and/or internationally.

Enrollment in Landscape Architecture and Urban and Regional Planning Programs

1. Students must have satisfactorily completed at least 54 hours of coursework with a minimum GPR of 2.5 for those courses completed at Texas A&M University to apply for upper level.
2. Students must satisfactorily complete the courses listed below as part of the 54 hours of coursework with a minimum of a 2.5 GPR to be considered to upper level.

3. Student must apply to the upper level through the department. The application is to be submitted the semester or summer session in which all of the above criteria are met.

- March 1 for Summer admission
- June 15 for Fall admission
- October 1 for Spring admission

**Landscape Architecture**

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<tr>
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<th>Course Title</th>
<th>Credit Hours</th>
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<td>ARCH 250</td>
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<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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<td>LAND 200/ URPN 200</td>
<td>Introduction to Landscape Architectural Practice</td>
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<td>LAND 240</td>
<td>History of Landscape Architecture</td>
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<td>LAND 254</td>
<td>Landscape Architecture Communications I</td>
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<td>LAND 255</td>
<td>Landscape Architectural Communications II</td>
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<td>LAND 318</td>
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<td>LAND 319</td>
<td>Landscape Design II</td>
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<td>Landscape Construction I</td>
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<td>LAND 330</td>
<td>Landscape Construction II</td>
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<td>Fundamentals of Ecology</td>
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**Urban & Regional Planning**

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<td>Composition and Rhetoric</td>
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<td>POLS 206</td>
<td>American National Government</td>
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<td>POLS 207</td>
<td>State and Local Government</td>
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<td>RENR 205</td>
<td>Fundamentals of Ecology</td>
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<td>Conservation of Natural Resources</td>
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<td>Introduction to Landscape Architectural Practice</td>
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<td>URPN 201</td>
<td>The Evolving City</td>
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<td>Building Better Cities</td>
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<td>URPN 210</td>
<td>Urban Analytical Methods I</td>
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<td>URPN 220</td>
<td>Digital Communication I</td>
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<tr>
<td>URPN 325</td>
<td>Introduction to GIS in Urban and Regional Planning</td>
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</table>

**Total Semester Credit Hours** 45

**Faculty**

Anderson, Sammy K, Executive Associate Professor
Landscape Arch & Urban Planning
PhD, Texas A&M University, 1993

Booth, Geoffrey J, Associate Professor
Landscape Arch & Urban Planning
PhD, Texas A&M University, 1981

Bard, Philip R, Professor
Landscape Arch & Urban Planning
PhD, Texas A&M University, 1980

Booth, Sherry I, Professor
Landscape Arch & Urban Planning
PhD, University of Michigan, 1985

Barden, Eric K, Assistant Professor
Landscape Arch & Urban Planning
PhD, Texas A&M University, 2011

Bardenhagen, Eric K, Assistant Professor
Landscape Arch & Urban Planning
PhD, Texas A&M University, 1981

Bright, Elise M, Professor
Landscape Arch & Urban Planning
PhD, Texas A&M University, 1995

Booth, Geoffrey J, Associate Professor
Landscape Arch & Urban Planning
PhD, University of North Carolina at Chapel Hill, 2004

Cooper, John T, Associate Professor Of The Practice
Landscape Arch & Urban Planning
MA, University of Tennessee, 1999

Cowell, Robert S, Visiting Assistant Professor
Landscape Arch & Urban Planning
MA, University of Washington, 2004

Dvorak, Bruce D, Associate Professor
Landscape Arch & Urban Planning
MLA, University of Illinois at Urbana-Champaign, 1994

Giusti, Cecilia H, Associate Professor
Landscape Arch & Urban Planning
PhD, University of Texas, Austin, 2001

Graham, Eric K, Assistant Professor
Landscape Arch & Urban Planning
PhD, University of Pennsylvania, 1995

Huang, Chang S, Associate Professor
Landscape Arch & Urban Planning
PhD, University of California, Irvine, 2009

Joh, Kenneth, Assistant Professor
Landscape Arch & Urban Planning
PhD, University of California, Irvine, 2009

Kistler, Jun H, Assistant Professor
Landscape Arch & Urban Planning
PhD, Texas A&M University, 2010

Lee, Chanam, Professor
Landscape Arch & Urban Planning
PhD, University of Washington, 2004

Li, Ming-Han, Professor
Landscape Arch & Urban Planning
PhD, Texas A&M University, 2002
Li, Wei, Assistant Professor  
Landscape Arch & Urban Planning  
PhD, University of California, Irvine, 2011

Martin, June C, Senior Lecturer  
Landscape Arch & Urban Planning  
MLA, University of Georgia, 2002

Merrill, Jeremy, Assistant Professor  
Landscape Arch & Urban Planning  
PhD, Kansas State University, 2014  
MLA, Kansas State University, 2009

Mickelson, Kimberley, Visiting Associate Professor  
Landscape Arch & Urban Planning  
JD, University of Texas School of Law, 1986

Ndubisi, Forster O, Professor  
Landscape Arch & Urban Planning  
PhD, University of Waterloo, 1987

Newman, Galen D, Assistant Professor  
Landscape Arch & Urban Planning  
PhD, Clemson University, 2010

Peacock, Walter G, Professor  
Landscape Arch & Urban Planning  
PhD, University of Georgia, 1986

Qu, Tongbin, Lecturer  
Landscape Arch & Urban Planning  
PhD, Texas A&M University, 2010

Reid, Russell W, Assistant Professor Of The Practice  
Landscape Arch & Urban Planning  
MAR, Texas A&M University, 2001

Rodiek, Jon, Professor  
Landscape Arch & Urban Planning  
PhD, University of Massachusetts, 1974

Rogers, George O, Professor  
Landscape Arch & Urban Planning  
PhD, University of Pittsburgh, 1983

Teal, Michael A, Assistant Professor Of The Practice  
Landscape Arch & Urban Planning  
MLA, Texas A&M University, 1996

Van Zandt, Shannon S, Associate Professor  
Landscape Arch & Urban Planning  
PhD, University of North Carolina at Chapel Hill, 2004

Varni, James W, Professor  
Landscape Arch & Urban Planning  
PhD, University of California, Los Angeles, 1976

Woo, Ayoung, Lecturer  
Landscape Arch & Urban Planning  
PhD, Texas A&M University, 2014

Wunneburger, Douglas F, Senior Lecturer  
Landscape Arch & Urban Planning  
PhD, Texas A&M University, 1992

Xiao, Yu, Associate Professor  
Landscape Arch & Urban Planning  
PhD, University of Illinois at Urbana-Champaign, 2008

Majors
- Bachelor in Landscape Architecture (p. 201)
- Bachelor of Science in Urban and Regional Planning (p. 202)

Minors
- Urban and Regional Planning Minor (p. 203)

Landscape Architecture - BLA

The Bachelor of Landscape Architecture (BLA) curriculum offers a sequence of courses to prepare students for entry into professional practice. By combining a broad general education and strong professional training, the curriculum emphasizes the acquisition and application of advanced knowledge to develop students’ critical thinking and creative problem-solving abilities. The program provides opportunities for students to develop special professional interests in a chosen area of concentration.

Graduates from the BLA program are prepared for employment with private practice firms in landscape architecture, engineering, architecture, or planning; and with federal, state, or local government agencies. Upon graduation students are qualified to pursue licensure in the profession or post graduate education in landscape architecture or a related field.

Because of the important role of computing in the disciplines housed within the College of Architecture, all entering students are required to possess a portable, network-ready personal computer capable of running software appropriate to their academic program. Financial aid is available to assist students in their computer purchases. No student will be denied admission to Texas A&M University based on an inability to purchase a computer. Additional information is available on the Department of Landscape Architecture and Urban Planning website.

Program Requirements

First Year

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<th>Term</th>
<th>Semester Credit Hours</th>
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<td>Fall</td>
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<td>LAND 200/URPN 200</td>
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<td>LAND 254</td>
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<tr>
<td>ARCH 250</td>
<td>Survey of World Architecture History II 3</td>
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<td>Landscape Architectural Communications II 3</td>
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<tr>
<td>KINE 120</td>
<td>The Science of Basic Health and Fitness 1</td>
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</table>
Urban and Regional Planning - BS

The Bachelor of Science in Urban and Regional Planning degree program is based in the Department of Landscape Architecture and Urban Planning (LAUP) within the College of Architecture at Texas A&M University. The Urban and Regional Planning program equips students for entry-level positions in planning allied fields and prepares them for graduate studies in fields such as Urban Planning and Land Development. The core curriculum, designed to equip students with knowledge and skills to deal effectively with the opportunities and challenges inherent in the development, growth and culture of neighborhoods, cities, and regions, is based on theoretical training in the natural, physical, and social sciences. Students acquire skills that enable them to apply these theories to develop communities, cities, and regions which are safe, healthy, and sustainable.

Critical thinking and analytical skills are emphasized for problem-solving at the community and regional scale. Classroom service-learning experiences enable graduates to more reliably and realistically assess complex community problems, design solutions for overcoming those problems, and evaluate the outcomes of programs and policies in meeting community and regional needs. Specialized Emphasis Area electives are tailored to help students further specialize their career goals in:

- Environmental planning and analysis
- Housing and urban development

Program Requirements

First Year

Fall

<table>
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<th>Course</th>
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<tbody>
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<td>ENGL 104</td>
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Summer

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Fall

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Spring

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<th>Course</th>
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Second Year

Fall

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<td>LAND 240</td>
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<td>LAND 318</td>
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<td>POLS 206</td>
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Spring

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Computer Elective

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Third Year

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Spring

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Fourth Year

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Spring

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<td>LAND 442</td>
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Total Semester Credit Hours: 128

1. Any approved university core curriculum history course
2. This course will be selected in consultation with the student’s advisor.
3. URPN 320 or URPN 325 or approval of BLA Program Coordinator
4. URPN 201 or URPN 330 or URPN 370
5. URPN 361 or URPN 460

A grade of C or better is required in College of Architecture courses (CARC, COSC, ENDs, ARCH, URPN, LAND, VIST, ARTS) to satisfy Landscape Architecture degree requirements.

Any student wishing to change majors into the Landscape Architecture program must have less than 60 total hours, including all transfer hours.

Urban and Regional Planning - BS

Program Requirements

First Year

Fall

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Spring

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<td>LAND 421</td>
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<td>LAND 442</td>
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Total Semester Credit Hours: 128

1. Any approved university core curriculum history course
2. This course will be selected in consultation with the student’s advisor.
3. URPN 320 or URPN 325 or approval of BLA Program Coordinator
4. URPN 201 or URPN 330 or URPN 370
5. URPN 361 or URPN 460

A grade of C or better is required in College of Architecture courses (CARC, COSC, ENDs, ARCH, URPN, LAND, VIST, ARTS) to satisfy Landscape Architecture degree requirements.

Any student wishing to change majors into the Landscape Architecture program must have less than 60 total hours, including all transfer hours.

Urban and Regional Planning - BS

Program Requirements

First Year

Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104</td>
<td>3</td>
</tr>
<tr>
<td>MATH 141</td>
<td>3</td>
</tr>
<tr>
<td>POLS 206</td>
<td>3</td>
</tr>
<tr>
<td>URPN 200/LAND 320</td>
<td>1</td>
</tr>
</tbody>
</table>

Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAND 421</td>
<td>5</td>
</tr>
<tr>
<td>LAND 442</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours: 128

1. Any approved university core curriculum history course
2. This course will be selected in consultation with the student’s advisor.
3. URPN 320 or URPN 325 or approval of BLA Program Coordinator
4. URPN 201 or URPN 330 or URPN 370
5. URPN 361 or URPN 460

A grade of C or better is required in College of Architecture courses (CARC, COSC, ENDs, ARCH, URPN, LAND, VIST, ARTS) to satisfy Landscape Architecture degree requirements.

Any student wishing to change majors into the Landscape Architecture program must have less than 60 total hours, including all transfer hours.
MATH 142  Business Mathematics II  3
POLS 207  State and Local Government  3
URPN 220  Digital Communication I  3
American history (p. 23)  3
Creative arts  3
Select one of the following:
ARCH 250  Survey of World Architecture History II  3
ARCH 350  History and Theory of Modern and Contemporary Architecture  3
ENDS 101  Design Process  3
ARTS 150  Art History Survey II  3

**Term Semester Credit Hours**  15

**Second Year**

**Fall**
ECON 202  Principles of Economics  3
RENR 205  Fundamentals of Ecology  3
URPN 202  Building Better Cities  3
URPN 325  Introduction to GIS in Urban and Regional Planning  3
Social and behavioral sciences (p. 23)  3

**Term Semester Credit Hours**  15

**Spring**
RENR 375  Conservation of Natural Resources  3
URPN 210  Urban Analytical Methods I  3
Language, philosophy, and culture (p. 21)  3
Life and physical sciences (p. 20)  5
Select one of the following Sociology electives:
SOCI 230  Classical Sociological Theory  3
SOCI 312  Population and Society  3
SOCI 314  Social Problems  3

**Term Semester Credit Hours**  17

**Third Year**

**Fall**
ENGL 210  Technical and Business Writing  3
RENR 215  Fundamentals of Ecology—Laboratory  1
URPN 310  Urban Analytical Methods II  3
URPN 330  Land Development I  3
URPN 489  Special Topics in...  1
Concentration/Directed elective  3
Concentration/Directed elective  3

**Term Semester Credit Hours**  17

**Spring**
CARC 481  Seminar  1
URPN 302  Planning Law  3
URPN 331  Public and Private Infrastructure Funding  3
URPN 469  Urban Infrastructure  3
Concentration/Directed elective  3
Elective  4

**Term Semester Credit Hours**  17

**Fourth Year**

**Fall**
Select one of the following:  6
URPN 484 or Internship or Internship  3
URPN 494  Study Abroad  3
Elective  3

**Term Semester Credit Hours**  9

**Spring**
URPN 401  Policy Implementation  3
URPN 493  Urban and Regional Studies Capstone Course  5
Concentration/Directed elective  3
Elective  3

**Term Semester Credit Hours**  14

**Total Semester Credit Hours:** 120

---

A grade of C or better is required in all courses to satisfy Urban and Regional Planning degree requirements.

### Urban and Regional Planning - Minor

By pursuing a minor in urban planning at Texas A&M, students will earn an education within a multi-disciplinary atmosphere where analytical skills and critical thinking are harvested. Students will then apply this acquired knowledge to address real-world issues which communities and regions face on a daily basis. Those earning a minor in urban planning can effectively solve problems related to a number of complex issues involving the built and natural environment, transportation, health, economic development, among others.

The minor in urban planning program will provide a solid educational basis for those students wishing to pursue a post-graduate education within the planning field. Also, because of its broad scope, the minor program may serve as an effective introduction to graduate studies in other social science disciplines such as economics, geography, political science, and public policy.

The minor program will prepare students for entry-level positions in a variety of fields including state and local government; advocacy, grant-making and civic organizations; real estate management; environmental science; social assistance services; and health care services.

### Program Requirements

**URPN 201**  The Evolving City  1
**URPN 202**  Building Better Cities  3
Select 9 hours from the following:
- URPN 340  Housing and Community  3
- URPN 361  Urban Issues  3
- URPN 370  Health Systems Planning  3
- URPN 460  Sustainable Communities  3
- URPN 471  Planning Healthier Communities  3

**Total Semester Credit Hours** 15
University Studies Programs

The College of Architecture offers a degree in University Studies. A University Studies degree differs from a traditional "major" in that it consists of a concentration and two minors of 15-18 hours each. The University Studies degree format was created to provide students the flexibility to combine areas of study that are of special interest.

Majors

• Bachelor of Science in University Studies, Global Arts, Planning, Design and Construction Concentration (p. 204)

University Studies - BS, Global Arts, Planning, Design and Construction Concentration

The Global Arts, Planning Design and Construction concentration is an interdisciplinary course of study that integrates multiple aspects of the built environment. The course offerings are from all of the professional undergraduate programs within the College of Architecture and are intended to give students an understanding of the interplay of professions that are required to work as a team in order to successfully complete built environment projects. These foundation courses are coupled with a required study abroad experience. All students in the College of Architecture are required to participate in a semester away experience that serves to expand the context of their education. The benefit of this experience is integrated into the concentration at a smaller scale.

Program Requirements

Concentration Requirements

Design
Select one of the following:
- ARCH 249 Survey of World Architecture History I
- ARCH 250 Survey of World Architecture History II
- ENDS 101 Design Process

Landscape
- LAND 240 History of Landscape Architecture

Construction
- COSC 153 Introduction to the Construction Industry
- or COSC 253 Construction Materials and Methods I

Leadership
- ALED 340 Survey of Leadership Theory

Urban Planning
- URPN 201 The Evolving City
- or URPN 202 Building Better Cities

Study Abroad
- CARC 481 Seminar
- CARC 300 College of Architecture Study Abroad (must be led by faculty)

Directed electives
Select one of the following:

Other courses may be used with approval of the major advisor and the Dean of the College of Architecture. A 2.0 GPA is required in all major field of study courses. Two writing-intensive courses are required. Two courses must meet the International and Cultural Diversity requirement, however, BUSN 289 cannot be used.

Department of Visualization

Visualization is the study of the art and science used in the creation of traditional and digital visual communication. The Bachelor of Science in Visualization is a four-year undergraduate degree requiring a minimum of 120 credit hours. The degree prepares students for the artistic and technical demands facing digital content creators. For those applicants interested in the design of the built environment, see the Bachelor of Environmental Design.

Enrollment in Visualization Program

Students enrolled in the Bachelor of Science in Visualization (VISL) program will be granted automatic admission to the Sophomore level art and visualization courses by obtaining a 3.6 GPR in category A courses and a 3.0 GPR in category B courses and completing 27 semester credit hours during the first two semesters in the Visualization Program (VISL).

Catagory A
- ARTS 115 Drawing for Visualization
- VIST 105 Principles of Design I
- VIST 106 Principles of Design II

Catagory B
- MATH 151 Engineering Mathematics I
- PHYS 201 College Physics
- VIST 170 Introduction to Visualization Computing Environments

If AP or Dual Credit courses are available as substitutions in any of the above courses, sequential or other art/visualization/math/science courses...
taken at Texas A&M University will be used to calculate the respective GPRs. For change of major and transfer students, equivalent transferable courses may be substituted for any of the above courses. In this case, courses taken at Texas A&M University in the same program area will be specified and used to calculate the respective GPRs.

Students not automatically admitted will be allowed on a space available basis into sophomore level art and visualization courses based on a ranking of the combined GPA of the Category A and Category B courses. An optional 500 word essay may be submitted to explain extenuating circumstances related to the 1st year academic experience and provide justification why the student should be allowed to take sophomore level courses. The essay may be used to adjust the overall student ranking.

Transfer and Change of Major Students

Transfer and change of major students (students currently enrolled in another major at Texas A&M University) who are admitted to the Department of Visualization are classified as lower level (VISL).

Faculty

Akleman, Ergun, Professor
Visualization
PhD, George Institute of Technology, 1992

Bologan, Anatol, Lecturer
Visualization
MA, University of London, 2012

Braman, Gavin S, Lecturer
Visualization
BEd, Texas A&M University, 2009

Davison, Richard R, Professor
Visualization
MFA, Washington University in St. Louis, 1979

Eilers, Howard F, Associate Professor
Visualization
MFA, Ohio University, 1964

Finch, Krista S, Lecturer
Visualization
MFA, Maryland Institute College of Art, 2000

Finch, Sherman S, Assistant Professor
Visualization
MA, Maryland Institute, 1998
MFA, Maryland Institute College of Art, 1997

Galanter, Philip, Associate Professor
Visualization
MFA, School of Visual Arts, 1999

Hajash, Donna J, Instructional Associate Professor
Visualization
MA, Siena Heights College, 1981

House, Felice L, Assistant Professor
Visualization
MFA, University of Texas, Austin, 2011

Jenks, Morgan M, Lecturer
Visualization
BA, Sam Houston State University, 2011
MFA, Texas A&M University, 2014

Koustov, Dmitri V, Lecturer
Visualization
BFA, Ivanovo Art institute, 1987

Kraguljac, Igor, Assistant Professor Of The Practice
Visualization
MS, Texas A&M University, 2008

Lafayette, Carol J, Professor
Visualization
MFA, University at Buffalo, State University of New York, 1991

Larsen, Terry R, Associate Professor
Visualization
MS, Cornell University, 1975

McLaughlin, Timothy D, Associate Professor
Visualization
MS, Texas A&M University, 1994

McNamara, Ann M, Associate Professor
Visualization
PhD, University of Bristol, UK, 2000

Parke, Frederic I, Professor
Visualization
PhD, University of Utah, 1974

Quek, Francis K, Professor
Visualization
PhD, University of Michigan, 1990

Ringham, Michael, Lecturer
Visualization
MS, Texas A&M University, 1996

Seo, Jinsil, Assistant Professor
Visualization
PhD, Simon Fraser University, 2011
MFA, School of Visual Arts, 2004

Stoenescu, Livia, Lecturer
Visualization
PhD, Queen's University, 2010

Sutherland, Susan D, Lecturer
Visualization
MA, University of Wisconsin-Madison, 1994

Tassinari, Louis G, Professor
Visualization
PhD, Dartmouth College, 1985
JD, Boston College, 2003

Thomas, Andre, Lecturer
Visualization
Vigus, Glen, Lecturer
Visualization
MEd, Texas A&M University, 2005
MA, Stephen F. Austin State University, 1994

Woodfin, Samuel H, Lecturer
Visualization
BA, Art Center College of Design, 2011

Majors
• Bachelor of Science in Visualization (p. 206)

Minors
• Art Minor (p. 206)

Visualization - BS

The mission of the Bachelor of Science in Visualization program is to engage and develop the student’s visual, intuitive and analytical capabilities through the scientific and aesthetic issues surrounding the use of technology in visual communication. To fulfill its mission, the program requires both a creative spirit and the technical understanding to adapt to the changing demands of the visual industries served by the departmental programs.

The curriculum integrates elements of fine arts, three-dimensional design, scientific inquiry and digital technology to provide a broad, wide-ranging educational experience. The core of the program is the studio experience, which explores the relationship between theory and practice through a variety of exercises and projects using traditional and electronic media. A variety of directed electives allows the student to gain an in-depth understanding in an area of specialization.

Graduates of the program are prepared to be technically adept artists, designers and/or tool-makers capable of utilizing interactive and directed media. Employment may be found in such fields as graphic and web design, the entertainment industry (game design and development, animation and visual effects), as well as fields such as architectural presentation, modeling and simulation, and other fields where visualization contributes to understanding. Alternatively, graduates may enter graduate programs that emphasize digital media in either computer science or art/design. Two such programs, the Master of Science (MS) in Visualization and the Master of Fine Arts (MFA) in Visualization, are offered by the Department of Visualization at Texas A&M University.

Program Requirements

Visualization Curriculum

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARTS 149</td>
<td>Art History Survey I</td>
<td>3</td>
</tr>
<tr>
<td>ARTS 349</td>
<td>The History of Modern Art</td>
<td>3</td>
</tr>
<tr>
<td>ARTS 104</td>
<td>Introduction to Graphic Design</td>
<td>1</td>
</tr>
<tr>
<td>ARTS 115</td>
<td>Drawing for Visualization</td>
<td>3</td>
</tr>
<tr>
<td>ARTS 212</td>
<td>Life Drawing</td>
<td>3</td>
</tr>
<tr>
<td>VIST 201</td>
<td>Writing for Design</td>
<td>1</td>
</tr>
<tr>
<td>VIST 170</td>
<td>Introduction to Visualization Computing Environments</td>
<td>1</td>
</tr>
<tr>
<td>VIST 270</td>
<td>Computing for Visualization I</td>
<td>3</td>
</tr>
<tr>
<td>VIST 271</td>
<td>Computing for Visualization II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Take the following course three times.</td>
<td></td>
</tr>
</tbody>
</table>

VIST 284 Visualization Techniques  3
VIST 375 Foundations of Visualization  3
VIST 441 Scientific and Technological Developments in Visual Arts  3

Directed electives  15
Free electives  3

University Core Curriculum

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>Communication (p. 20)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 152</td>
<td>Engineering Mathematics II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 201</td>
<td>College Physics</td>
<td>4</td>
</tr>
<tr>
<td>Life and physical sciences (p. 20)</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Language, philosophy and culture (p. 21)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>ARTS 150</td>
<td>Art History Survey II</td>
<td>3</td>
</tr>
<tr>
<td>Social and behavioral sciences (p. 23)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>HIST 105</td>
<td>History of the United States</td>
<td>3</td>
</tr>
<tr>
<td>HIST 106</td>
<td>History of the United States</td>
<td>3</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours  120

1 Select from any 300-499 course not used elsewhere. If you do not participate in study abroad, 3 hours will come from ICD.

A grade of C or better must be made in all College of Architecture courses (ARCH, ARTS, CARC, COSC, ENDS, LAND, LDEV, VIST, URPN and VIZA). Students must also make a grade of C or better in any course used as an equivalent substitution for College of Architecture courses that satisfy degree requirements.

Art - Minor

Students pursuing other majors may minor in Art by taking a minimum of 18 hours. There are two emphases within the minor, traditional media and new media.

Students must have a minimum cumulative GPR of 2.75 and must maintain a “C” average or better in all courses completed as part of the minor in Art. The student’s home college/department may grant, with agreement from the Department of Visualization, transfer credit of no more than six credit hours. Transfer credit will not be accepted for any 300- or 400-level course.

Per University guidelines, the student’s home college/department is responsible for advising students pursuing a minor in Art.

Program Requirements

ARTS 349 The History of Modern Art  3
Select one of the following emphases:  15

Traditional Media Emphasis

ARTS 115 Drawing for Visualization
Select four from the following:
ARTS 111 Drawing I
ARTS 212 Life Drawing
ARTS 305 Painting I
ARTS 308  Sculpture
ARTS 311  Black and White Photography
ARTS 312  Advanced Photography
ARTS 353  Color Theory
CARC 311  Field Studies in Design Communication
CARC 331  Field Studies in Design Philosophy
New Media Emphasis
ARTS 103  Design I
ARTS 104  Introduction to Graphic Design
Take the following course two times:
VIST 284  Visualization Techniques
Select three from the following:
ARTS 210  Introduction to Photography
ARTS 303  Graphic Design I
ARTS 304  Graphic Design II
ARTS 312  Advanced Photography
ARTS 325  Digital Painting
ARTS 403  Graphic Design III
VIST 372  Creating Digital Environments
VIST 374  Multimedia Design and Development
VIST 465  Art, Culture and Time Based Media
VIST 474  Designing for the Web

Total Semester Credit Hours 18

Minimum of 6 hours of 300- or 400-level courses are required.

Students must make a grade of "C" or better in all courses.

Diversity - Certificate

The College of Architecture offers a Diversity Certificate. The certificate program will provide students in the College of Architecture competencies to work in a diverse workplace.

Program Requirements

CARC 485  Directed Studies 1
  a. Orientation
  b. Co-curricular component
  c. Service learning component
  d. Capstone retreat

Prescribed electives 12

Total Semester Credit Hours 13
Mays Business School

Administrative Officers
Dean - Eli Jones, Ph.D.
Executive Associate Dean - Bala Shetty, Ph.D.
Associate Dean - Martha L. Loudder, Ph.D.
Director of Undergraduate Program - Peter K. Drysdale, M.S.

General Statement
A goal of Mays Business School is to help develop students to become effective managers, concerned citizens and life-long learners. Through challenging academic and enrichment programs, the business school provides students with numerous opportunities for intellectual, leadership and personal development.

In support of this student development goal, the curriculum in business has a dual emphasis—a broad-based education in the foundation disciplines of the liberal arts and the sciences, and a focused development of business knowledge and behavioral skills.

The program of study in business provides students a background in the basic academic areas—mathematics; language, philosophy and culture; life and physical, social and behavioral sciences; and, rhetoric and composition. Students simultaneously pursue introductory coursework in accounting, economics, business information systems and the legal environment of business. This broad educational foundation provides an enriching dimension to the university experience that cannot be attained in a more limited course of study.

Upon successful completion of this broad-based coursework, the student will begin to focus on a major field of study and a full range of business courses. The major field—chosen from the fields of accounting, finance, management, management information systems, marketing, and supply chain management— is designed to prepare students for an entry-level organizational position as well as subsequent career development. Each major has a set of required courses, as well as electives, from which students may gain additional depth in the chosen area. Students admitted to Mays Business Honors pursue an interdepartmental degree in business honors.

This combination of a broad educational foundation and more specialized study produces graduates uniquely qualified to deal with the rapidly changing and diverse global economy.

Requirements for Graduation
Requirements for graduation are listed in the Texas A&M University Student Rules and this catalog.

With the exception of general elective requirements, courses taken to satisfy degree requirements must be taken for letter grades.

In addition, students in Mays Business School must have a GPR of 2.0 in the courses included in the Common Body of Knowledge. Undergraduate business students must take two writing-designated (W) business courses. The requirement may be met by taking two writing (W) business courses or one W business course and one oral communication (C) business course. These W and C courses are major specific and are taken as part of the student’s upper-level coursework. See an academic advisor for additional information.

Transfer of Credits
Acceptance of transfer of credit for business courses will generally be limited to those courses taught in the freshman and sophomore years at this institution. Transfer credit is not offered for upper-level business courses.

Credit by Examination
Undergraduate students may receive credit for certain courses required in undergraduate business curricula by successfully completing Advanced Placement (AP), College Level Exam Program (CLEP) and departmental examination. Students should contact the Undergraduate Program Office (Room 238, Wehner Building) for information. Information concerning credit by examination may be obtained from the Data and Research Services (http://dars.tamu.edu) website or (979) 845-0532. A fee is charged for such an examination.

Students may not receive credit by examination for courses in which they are enrolled, which they have previously failed, or which are prerequisite to courses for which they already have credit.

Bachelor’s Degrees and Departments of Instruction
The academic program of Mays Business School is organized in the following majors: Accounting, Business Honors, Finance, Management, Management Information Systems, Marketing, and Supply Chain Management. Bachelor of Business Administration degrees are offered in each of these seven majors.

A Bachelor of Science in University Studies with concentration in business (USBU) is offered.

Bachelor of Business Administration
The degree of Bachelor of Business Administration is offered in these seven majors: accounting, business honors, finance, management, management information systems, marketing, and supply chain management. Each requires a minimum of 120 semester credit hours of study. The student elects one of these as a “major,” but is also required to study fundamental theory and procedure in each of the basic business functions. In addition, the student takes courses essential to a general liberal education.

The following is a representation of the curriculum requirements by major.

<table>
<thead>
<tr>
<th>Major</th>
<th>Accounting</th>
<th>Business</th>
<th>Finance</th>
<th>Honors</th>
<th>Manager</th>
<th>Manager</th>
<th>Marketing</th>
<th>Supply Chain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Knowledge</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>Body of Knowledge</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
</tr>
</tbody>
</table>
Courses required in major, not included in core | 24 | 19 | 18 | 29 | 28 | 26
---|---|---|---|---|---|---
General electives | 12 | 8 | 9 | 7 | 8 | 10
International electives | 6\(^1\) | 6\(^1\) | 6\(^1\) | 6\(^1\) | 6\(^1\) | 6\(^1\)
Other required courses:
- Accounting | 3
- American history | 6
- Business law | 6
- Commm 6 | 6
- Creative arts | 3
- Data analysis | 3
- Economics | 3
- Government/political science | 6
- Language, philosophy and culture | 3
- Life and physical science | 9
- Mathematics | 6
- Social and behavior science | 3
Total Semester Credit Hours | 120 | 120 | 120 | 120 | 120 | 120

1 Selected from a list of approved international electives for business students. In the BBA curricula, the 6 hours of approved international elective courses simultaneously fulfill the University’s International and Cultural Diversity Graduation requirement. Management majors must take MGMT 450/IBUS 450.

2 Management majors are advised to take PSYC 107 or SOCI 205.

**BBA Common Body of Knowledge**

**Required Courses**
- ACCT 229 Introductory Accounting 3
- ACCT 230 Introductory Accounting 3

**Upper-Level Entry into Accounting, Business Honors, Finance, Management, Management Information Systems, Marketing and Supply Chain Management (BBA)**

Students who meet the University and college entrance requirements enter Mays Business School in the BUAD (lower-level business) classification. Enrollment of Mays Business School students in junior- and senior-level business courses is limited to those who have been admitted to upper-level (also referred to as upper division) in one of the seven BBA majors: accounting, business honors, finance, management, management information systems, marketing, and supply chain management.

**Cooperative Education**

Cooperative education is designed to augment the academic program of study with on-the-job training. To be eligible to participate, a business undergraduate must have completed 45 credit hours and have a minimum 2.5 GPA. Interested students should contact the Career Center at (979) 845-5139 or 209 Koldus.

**Restrictions on Two Degrees**

Mays Business School is enrollment managed; demand for admission to the undergraduate business program consistently exceeds available educational resources. Priority is given to qualified applicants for their initial bachelor’s degree.

**Double Major**

Only Business Honors majors may elect a second major field of study within the BBA degree. The first major must be business honors. The Business Honors student must satisfy all University and Business School requirements and complete all curriculum requirements for each major. This option leads to the granting of one BBA degree with two majors. Additional restrictions may apply.

**Double Degree**

Approval of double degrees (BBA with BA or BS) is granted by exception only. A written appeal for a double degree may be submitted; the appeal should reflect an excellent academic record, support from the BA or BS granting college, and a compelling justification.

**Second Degree**

Postbaccalaureate admission to Mays is severely restricted and granted by exception only. Applicants for a postbaccalaureate business degree
may present a case for an exception to this enrollment restriction in
the essay of a complete Texas A&M admission application. Generally,
eligible applicants are denied postbaccalaureate admission but may be
couraged to apply, instead, to an appropriate graduate degree program.

International Certificate Programs
To meet the challenges of increased business globalization Mays
Business School has created a variety of international certificate
programs. Each program offers BS—Agribusiness degree students the
opportunity to study international business, develop understanding of other
cultures and language knowledge to meet global business challenges.

Students who pursue any of the international certificate programs must
complete all requirements for the specific program prior to graduation.
Specific certificate requirements are available in the Undergraduate
Program Office, Room 238 Wehner, of Mays Business School or in the
Undergraduate Programs Office, Room 214 of the Agriculture and Life
Sciences Building, of the Department of Agricultural Economics.

Information regarding the following certificates can be found in the Mays
Business School (p. 208) section.

• Certificate in International Business Studies (http://
maysweb.tamu.edu/cibs/for-students/international-business-
certificates/international-business-certificate)
• Certificate in European Union Business (http://maysweb.tamu.edu/
cibs/for-students/international-business-certificates/european-union-
business-certificate)
• Certificate in Latin American Business (http://maysweb.tamu.edu/
cibs/for-students/international-business-certificates/latin-american-
business-certificate)
• Certificate in Entrepreneurial Leadership (http://cnve.tamu.edu/
students/education/undergraduate)
• Certificate in Advertising (http://mays.tamu.edu/mktg/advising/careers/
tracks)
• Certificate in Retailing (http://mays.tamu.edu/mktg/advising/careers/
tracks)
• Certificate in Sales (http://mays.tamu.edu/mktg/advising/careers/
tracks)
• Certificate in Not-for-Profit Business (http://maysweb.tamu.edu/
maysnet/wp-content/uploads/sites/5/formidable/
CertificateInNotForProfitBusiness.pdf)

International and Cultural Diversity
Requirement
Texas A&M University requires its students to meet an International and
Cultural Diversity requirement as part of the University’s Graduation
requirement. Business students meet this requirement by taking six
(6) hours of coursework from an approved list of international elective
courses.

In the BBA curricula the 6 hours of approved international elective
coursework simultaneously fulfill the University’s International and Cultural
Diversity Graduation requirement.

Majors

Mays Business School
• Bachelor of Business Administration in Business Honors (p. 211)
• Bachelor of Science in University Studies, Business Concentration
  (p. 240)

Department of Accounting
• Bachelor of Business Administration in Accounting (p. 215)

Department of Finance
• Bachelor of Business Administration in Finance (p. 218)

Department of Information and Operations
Management
• Bachelor of Business Administration in Management Information
  Systems (p. 222)
• Bachelor of Business Administration in Supply Chain Management
  (p. 224)

Department of Management
• Bachelor of Business Administration in Management (p. 227)

Minors

Mays Business School
• Business Administration Minor (p. 211)

Certificates

Mays Business School
• European Union Business Certificate (http://catalog.tamu.edu/
  undergraduate/business/european-union-business-certificate)
• International Business Studies Certificate (http://catalog.tamu.edu/
  undergraduate/business/international-business-studies-certificate)
• Latin American Business Certificate (http://catalog.tamu.edu/
  undergraduate/business/latin-american-business-certificate)
• Not-for-Profit Business Certificate (http://catalog.tamu.edu/
  undergraduate/business/not-for-profit-business-certificate)

Department of Accounting
• Energy Accounting Certificate (p. 217)

Department of Finance
• Commercial Banking Certificate (p. 220)
• Investment Banking Certificate (p. 220)
• Trading, Risk and Investments Certificate (p. 220)

Department of Management
• Entrepreneurial Leadership Certificate (p. 229)

Department of Marketing
• Advertising Strategy Certificate (p. 237)
• Analytics and Consulting Certificate (p. 238)
• Retail Buying and Management Certificate (p. 238)
Mays Business School

• Professional Selling and Sales Management Certificate (p. 239)

Masters

Mays Business School

• Master of Business Administration in Business Administration (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/business/interdepartmental/mba)

Department of Accounting

• Master of Science in Accounting (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/business/accounting/ms)

Department of Finance

• Master of Science in Finance (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/business/finance/ms)
• Master of Financial Management in Financial Management (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/business/finance/mfm)
• Master of Real Estate in Land Economics and Real Estate (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/business/finance/mre)

Department of Information and Operations Management

• Master of Science in Management Information Systems (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/business/information-operations-management/ms)

Department of Management

• Master of Science in Management (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/business/management/ms)

Department of Marketing

• Master of Science in Marketing (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/business/marketing/ms)

Doctoral

Mays Business School

• Doctor of Philosophy in Business Administration (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/business/interdepartmental/phd)

Department of Management

• Doctor of Philosophy in Management (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/business/management/phd)

Business Administration - Minor

Mays Business School offers a minor in Business Administration.

Students interested in pursuing a future MBA may find that when combined with appropriate statistics and economics coursework, the Mays minor in Business Administration provides the business foundation required by most MBA programs.

Program Requirements

The minor in business consists of six specific courses chosen to develop a foundational knowledge in the basic aspects of business, including accounting, finance, management information systems, management, and marketing.

The courses listed below constitute the 18 hours required for a minor in business.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 209</td>
<td>Survey of Accounting Principles</td>
<td>3</td>
</tr>
<tr>
<td>ISYS 209</td>
<td>Business Information Systems Concepts</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 209</td>
<td>Business, Government and Society</td>
<td>3</td>
</tr>
<tr>
<td>FINC 409</td>
<td>Survey of Finance Principles</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 309</td>
<td>Survey of Management</td>
<td>3</td>
</tr>
<tr>
<td>MKTG 409</td>
<td>Principles of Marketing</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours: 18

1. MGMT 212 cannot be used to meet this requirement.
2. Course must be taken in residence at Texas A&M. No transfer courses will be accepted.

Students must earn a grade of "C" or better in each course listed above to be awarded the business minor and receive transcript recognition.

Business Honors - BBA

Selection through a separate application process is required to participate in Business Honors. Students apply to Business Honors as incoming freshmen or during the spring semester of their freshmen year. Both are competitive selection processes.

Bachelor of Business Administration

A Bachelor of Business Administration (BBA) in Business Honors is a degree available only to students admitted to Mays' Business Honors program. The Business Honors major is designed for students whose academic excellence is matched by strong character, leadership skills, and teamwork. The Business Honors major prepares students to begin careers in all fields or to continue on to a graduate program or professional school.

Students pursuing a BBA in Business Honors must maintain a cumulative GPA of 3.5 or higher. Students are required to complete a total of 30 hours of honors coursework plus an internship for credit. Other program requirements apply.

Business Honors majors work closely with an academic advisor to identify a set of courses to meet their academic goals. They may pursue a double major in Business Honors and one of the six other BBA majors (accounting, finance, management, management information systems, marketing and supply chain management).

Upper-level Entry Requirements and Application Procedures

Students who meet the University and college entrance requirements enter Mays Business School in the BUAD (lower-level business) classification. Enrollment of Mays Business School students in junior- and senior-level business courses is limited to those who have been admitted to upper-level (also referred to as upper division) in one of the seven majors (B.B.A.: accounting, business honors, finance,
management, management information systems, marketing, and supply chain management) in the college.

The B.B.A. (accounting, business honors, finance, management, management information systems, marketing, and supply chain management) upper-level entry requirements and application procedures are as follows:

1. To be admitted to an upper-level major, a student must be admitted to Mays Business School and must have:
   a. Satisfactorily completed the following five courses:
      - ACCT 229 Introductory Accounting 3
      - ECON 202 Principles of Economics 3
      - ECON 203 Principles of Economics 3
      - MATH 141 Business Mathematics I (or its equivalent) 3
      - MATH 142 Business Mathematics II (or its equivalent) 3
   b. BUAD students apply for upper level no later than the last class day of the semester before they expect to enter upper level. To enter upper level in the summer, all requirements must be completed by the beginning of the first summer session.
   c. Unless satisfactorily completed prior to upper-level entry, business students must successfully complete these three remaining lower-level Common Body of Knowledge (CBK) courses at Texas A&M during their first upper-level semester:
      - ACCT 230 Introductory Accounting 3
      - ISYS 210 Fundamentals of Information Systems 3
      - MGMT 211 Legal and Social Environment of Business 3
   d. Students are encouraged to complete the freshman and sophomore sequence of courses as listed under Curriculum in Business. BUAD students may pre-register for upper-level business courses in the semester for which they have applied for upper level. However, BUAD students who fail to complete upper-level requirements prior to the start of the semester shall not be permitted to remain registered in upper-level business classes.

2. Transfer students: Transfer students admitted to Mays Business School will be classified as BUAD (lower-level Business) students until they complete all requirements listed previously in item 1, at which time they may apply for admission to an upper-level major field of study. Transfer students may immediately apply for upper-level when admitted to Mays Business School if, and only if, they meet all upper-level requirements at that time.

3. Change of curriculum students: Texas A&M students who change curriculum into Mays Business School from another college or department at the University will be classified as BUAD (lower-level Business) students until they complete all requirements listed previously in item 1. Change of curriculum students who, when admitted to the business school, qualify to apply for admission to upper level may do so.

4. Preference for available seats in junior- and senior-level business courses will be given to students who have been admitted to a degree granting major in Mays Business School. All ineligible students who pre-register for upper-level business classes are subject to cancellation of their registration in these courses.

### Program Requirements

#### Lower-Level Business Program (BUAD)

**First Year**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credit Hours</th>
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<tr>
<td>Fall</td>
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</tr>
<tr>
<td>MATH 141</td>
<td>Business Mathematics I 1 3</td>
</tr>
<tr>
<td>American history (p. 23) 2</td>
<td>3</td>
</tr>
<tr>
<td>Communication</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
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<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
</tr>
<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
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<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
</tr>
<tr>
<td>Life and physical sciences (p. 20)</td>
<td>3</td>
</tr>
<tr>
<td>Social and behavioral sciences (p. 23)</td>
<td>3</td>
</tr>
<tr>
<td>Term Semester Credit Hours</td>
<td>15</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td>ECON 202</td>
<td>Principles of Economics</td>
</tr>
<tr>
<td>MATH 142</td>
<td>Business Mathematics II 1</td>
</tr>
<tr>
<td>American history (p. 23) 2</td>
<td>3</td>
</tr>
<tr>
<td>Language, philosophy and culture (p. 21)</td>
<td>3</td>
</tr>
<tr>
<td>Life and physical sciences (p. 20)</td>
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</tr>
<tr>
<td>Term Semester Credit Hours</td>
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</table>

**Second Year**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
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</tr>
<tr>
<td>ACCT 229</td>
<td>Introductory Accounting</td>
</tr>
<tr>
<td>ECON 203</td>
<td>Principles of Economics</td>
</tr>
<tr>
<td>ISYS 210</td>
<td>Fundamentals of Information Systems</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government 2</td>
</tr>
<tr>
<td>Communication</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
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</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
</tr>
<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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<tr>
<td>Term Semester Credit Hours</td>
<td>15</td>
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<tr>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td>ACCT 230</td>
<td>Introductory Accounting</td>
</tr>
<tr>
<td>MGMT 211</td>
<td>Legal and Social Environment of Business</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government 2</td>
</tr>
<tr>
<td>Creative arts (p. 22)</td>
<td>3</td>
</tr>
<tr>
<td>Life and physical sciences (p. 20)</td>
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<tr>
<td>Term Semester Credit Hours</td>
<td>15</td>
</tr>
<tr>
<td>Total Semester Credit Hours:</td>
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</tr>
</tbody>
</table>

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1. MATH 131, MATH 151 and MATH 171 will be accepted in lieu of MATH 142. MATH 152, MATH 166 and MATH 172 will be accepted in lieu of MATH 141.
2. For those students under ROTC contract, see Requirement 7 of the “Requirements for a Baccalaureate Degree” (p. 24).

Management Information Systems: BUAD students intending to major in Management Information Systems must add ISYS 250 Business Programming Logic and Design (3 credits) to sophomore year curriculum.
in Business (lower level). The creative arts elective or a communication elective can be taken during the junior year.

Business Honors: BUAD students admitted to Business Honors must add (1) BUSN 125 Business Learning Community I (3 credits) to the freshman year curriculum and (2) BUSN 205 Integrated Worklife Competencies (3 credits) to the sophomore year curriculum in Business (lower level). The creative arts elective or a communication elective can be taken during the junior year.

**Upper-Level Business Honors Program**

**Third Year**

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Fall</td>
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<tr>
<td>FINC 341</td>
<td>Business Finance 1</td>
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<tr>
<td>MKTG 321</td>
<td>Marketing 1</td>
</tr>
<tr>
<td>SCMT 303</td>
<td>Statistical Methods 1</td>
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<tr>
<td>General elective 2</td>
<td></td>
</tr>
<tr>
<td>International elective 3</td>
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<tr>
<td><strong>Term Semester Credit Hours</strong></td>
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</table>

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td>MGMT 363</td>
<td>Managing People in Organizations 1</td>
</tr>
<tr>
<td>SCMT 364</td>
<td>Operations Management 1</td>
</tr>
<tr>
<td>Upper-Division Business Elective 4</td>
<td></td>
</tr>
<tr>
<td>Upper-Division Business Elective 4</td>
<td></td>
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<tr>
<td><strong>Term Semester Credit Hours</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Term</th>
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</thead>
<tbody>
<tr>
<td>Fourth Year</td>
<td></td>
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<tr>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>BUSN 484</td>
<td>Internship</td>
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<tr>
<td>General elective 2</td>
<td></td>
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<tr>
<td>General elective 2</td>
<td></td>
</tr>
<tr>
<td>Upper-Division Business Elective 4</td>
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<tr>
<td>Upper-Division Business Elective 4</td>
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<tr>
<td><strong>Term Semester Credit Hours</strong></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td>MGMT 466</td>
<td>Strategic Management 5</td>
</tr>
<tr>
<td>General elective 2</td>
<td></td>
</tr>
<tr>
<td>International elective 3</td>
<td></td>
</tr>
<tr>
<td>Upper-Division Business Elective 4</td>
<td></td>
</tr>
<tr>
<td><strong>Term Semester Credit Hours</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours:** 54

1 Five of the nine Common Body of Knowledge classes listed must be taken as honors: ACCT 229, ACCT 230, FINC 341, ISYS 210, SCMT 303, SCMT 364, MGMT 211, MGMT 363, MKTG 321.

2 Elective courses are open to any course offered for University credit, except ACCT 209, ACCT 210, FINC 409, IBUS 301, ISYS 209, KINE 198, MGMT 209, MGMT 309, MKTG 409, SCMT 309. Additional restrictions may apply; see academic advisor for information. May be taken on a satisfactory/unsatisfactory basis.

3 Six hours required. A complete list of approved courses is available in the Undergraduate Program Office, Room 238, Wehner Building. In the BBA curricula, the 6 hours of approved international elective courses simultaneously fulfill the University’s International and Cultural Diversity Graduation requirement.

4 Any 300- or 400-level business elective selected in consultation with an academic advisor. At least one course must be designated as writing designated (W) or oral communication (C).

5 Must be taken as honors.

**Total Program Hours 120**

**Department of Accounting**

The accounting profession continues to be recognized as one of the world's leading professions and as one offering many opportunities for a challenging career. The major challenge confronting the accounting profession today is the continuous development of accounting and information systems that can be utilized by business firms operating in an increasingly complex global environment. Within this environment, businesses and government units are generating and utilizing information at an accelerating rate.

A degree in accounting provides the opportunity for entry into a career offering a variety of different and challenging paths. Many accounting graduates are employed by public accounting firms that provide assurance, tax and other services to all types of organizations. Other accounting graduates pursue careers with business firms and financial institutions, with all levels of government and as accounting educators. All of these careers provide an opportunity to earn the Certified Public Accountant (CPA) license and to serve society by maintaining the highest levels of integrity. The program listed in the following tables for the junior and senior years leads to the Bachelor in Business Administration (BBA) degree. This degree program provides the minimum credentials necessary for entry into most accounting careers. However, the BBA degree does not meet the requirements to sit for the CPA examination in Texas.

The American Institute of Certified Public Accountants (AICPA) recognizes the need for technically competent graduates entering the accounting profession. In response to the recommendations of the AICPA, other professional accounting organizations, and many professional accounting firms, the State of Texas requires candidates for the CPA certificate to have a minimum of 150 semester hours of college coursework, including at least 36 hours of accounting courses. As a consequence, highly motivated students are encouraged to give serious consideration to pursuing advanced studies at the graduate level to enhance their potential for a successful accounting career.

The Department of Accounting offers an integrated Professional Program that students enter during their junior year. The Professional Program offers a curriculum integrating undergraduate and graduate education. Graduates receive a BBA and a Master of Science degree (MS). This program offers opportunities for successful and motivated students to pursue academic coursework that challenges both their interests and abilities. The courses are taught by experienced faculty with superior teaching and professional credentials and are limited in class size.

The objectives of the Professional Program include developing sound conceptual, technical, analytical and communication skills that are required for success in the accounting profession. The program develops decision making and teamwork skills through extensive use of discussions and case studies. The program enables the student to select a specialization...
in assurance services/information management, information systems, financial management, marketing, entrepreneurship, or taxation. Each track offers the student an opportunity to participate in a professional accounting internship.

The department also offers a traditional Master’s Program (MS in Accounting) that students enter after completion of the Bachelor’s degree. For more details about the Professional Program or the Master’s Program, refer to the Texas A&M University Graduate and Professional Catalog or contact the director of the Professional Program in the Department of Accounting.

**Faculty**

Ahmed, Anwer S, Professor  
Accounting  
PhD, University of Rochester, 1992

Allen, Natalie L, Senior Lecturer  
Accounting  
MS, Texas A&M University, 1988

Barrett, Jeannie, Senior Lecturer  
Accounting  
MBA, Sam Houston State University, 2002

Benjamin, James J, Professor  
Accounting  
PhD, Indiana University, 1972

Blasor, Tara N, Lecturer  
Accounting  
MS, Texas A&M University, 2007

Deer, Shannon K, Senior Lecturer  
Accounting  
MS, Texas A&M University, 2004

Diaz, Michelle C, Clinical Assistant Professor  
Accounting  
PhD, Texas A&M University, 2005

Ege, Matthew, Assistant Professor  
Accounting  
PhD, University of Texas, Austin, 2013

Farmer, Karen C, Lecturer  
Accounting  
MS, Texas A&M University, 2009

Fiechtner, Susan B, Clinical Associate Professor  
Accounting  
PhD, University of Oklahoma, 1982

Flagg, James C, Associate Professor  
Accounting  
PhD, Texas A&M University, 1988

Foster, Courtney E, Lecturer  
Accounting  
MS, Texas A&M University, 2008

Grossman, Steven D, Associate Professor  
Accounting  
PhD, Tufts University, 1972

Kinney, Michael R, Associate Professor  
Accounting  
PhD, University of Arizona, 1990

Knoop, Jacqueline D, Lecturer  
Accounting  
MS, Texas A&M University, 1997

Lassila, Dennis R, Professor  
Accounting  
PhD, University of Minnesota, 1981

Louder, Martha L, Professor  
Accounting  
PhD, Arizona State University, 1990

McAnally, Mary L, Professor  
Accounting  
PhD, Stanford University, 1994

McGowan, Annie L, Associate Professor  
Accounting  
PhD, University of North Texas, 1994

McGuire, Sean T, Associate Professor  
Accounting  
PhD, University of Georgia, 2008

Moore, Morgan E, Lecturer  
Accounting  
MAC, University of Texas, Austin, 2008

Nafstad, April D, Lecturer  
Accounting  
MS, Texas A&M University, 1997

Nixon, Clair J, Professor  
Accounting  
PhD, Texas A&M University, 1980

Redman, Karen S, Executive Professor  
Accounting  
BBA, Texas A&M University, 1980

Rees, Lynn L, Professor  
Accounting  
PhD, Arizona State University, 1993

Rhodes, Adrienne C, Assistant Professor  
Accounting  
PhD, Pennsylvania State University, 2013

Rice, Sarah C, Assistant Professor  
Accounting  
PhD, Ohio State University, 2007

Roach, Kevin F, Executive Professor  
Accounting  
BS, State University of New York at Albany, 1973

Sanders, Joan T, Senior Lecturer  
Accounting  
MS, Texas A&M University, 1990
Majors
• Bachelor of Business Administration in Accounting (p. 215)

Professional Program in Accounting
• Bachelor of Business Administration in Accounting and Master of Science in Accounting

Certificates
• Energy Accounting Certificate (p. 217)

Masters
• Master of Science in Accounting

Accounting - BBA
Upper-level Entry Requirements and Application Procedures

Students who meet the University and college entrance requirements enter Mays Business School in the BUAD (lower-level business) classification. Enrollment of Mays Business School students in junior- and senior-level business courses is limited to those who have been admitted to upper-level (also referred to as upper division) in one of the seven majors (B.B.A.: accounting, business honors, finance, management, management information systems, marketing, and supply chain management) in the college.

The B.B.A. (accounting, business honors, finance, management, management information systems, marketing, and supply chain management) upper-level entry requirements and application procedures are as follows:

1. To be admitted to an upper-level major, a student must be admitted to Mays Business School and must have:
   a. Satisfactorily completed the following five courses:
      - ACCT 229 Introductory Accounting 3
      - ECON 202 Principles of Economics 3
      - ECON 203 Principles of Economics 3
      - MATH 141 Business Mathematics I (or its equivalent) 3
      - MATH 142 Business Mathematics II (or its equivalent) 3
   b. BUAD students apply for upper level no later than the last class day of the semester before they expect to enter upper level. To enter upper level in the summer, all requirements must be completed by the beginning of the first summer session.
   c. Unless satisfactorily completed prior to upper-level entry, business students must successfully complete these three remaining lower-level Common Body of Knowledge (CBK) courses at Texas A&M during their first upper-level semester:
      - ACCT 230 Introductory Accounting 3
      - ISYS 210 Fundamentals of Information Systems 3
      - MGMT 211 Legal and Social Environment of Business 3
   d. Students are encouraged to complete the freshman and sophomore sequence of courses as listed under Curriculum in Business. BUAD students may pre-register for upper-level business courses in the semester for which they have applied for upper level. However, BUAD students who fail to complete upper-level requirements prior to the start of the semester shall not be permitted to remain registered in upper-level business classes.

2. Transfer students: Transfer students admitted to Mays Business School will be classified as BUAD (lower-level Business) students until they complete all requirements listed previously in item 1, at which time they may apply for admission to an upper-level major field of study. Transfer students may immediately apply for upper-level when admitted to Mays Business School if, and only if, they meet all upper-level requirements at that time.

3. Change of curriculum students: Texas A&M students who change curriculum into Mays Business School from another college or department at the University will be classified as BUAD (lower-level Business) students until they complete all requirements listed previously in item 1. Change of curriculum students who, when
admitted to the business school, qualify to apply for admission to upper level may do so.

4. Preference for available seats in junior- and senior-level business courses will be given to students who have been admitted to a degree granting major in Mays Business School. All ineligible students who pre-register for upper-level business classes are subject to cancellation of their registration in these courses.

Program Requirements
Lower-Level Business Program (BUAD)

<table>
<thead>
<tr>
<th>First Year</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>Fall</td>
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<tr>
<td>MATH 141</td>
<td>Business Mathematics I</td>
</tr>
<tr>
<td>American history (p. 23)</td>
<td>3</td>
</tr>
<tr>
<td>Communication</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
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<tr>
<td>COMM 203 Public Speaking</td>
<td></td>
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<tr>
<td>COMM 243 Argumentation and Debate</td>
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<td>ENGL 104 Composition and Rhetoric</td>
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<td>3</td>
</tr>
<tr>
<td>Social and behavioral sciences (p. 23)</td>
<td>3</td>
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<table>
<thead>
<tr>
<th>Second Year</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>ACCT 229 Introductory Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ECON 203 Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>ISYS 210 Fundamentals of Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>POLS 206 American National Government</td>
<td>3</td>
</tr>
<tr>
<td>Communication</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
</tr>
<tr>
<td>COMM 203 Public Speaking</td>
<td></td>
</tr>
<tr>
<td>COMM 243 Argumentation and Debate</td>
<td></td>
</tr>
<tr>
<td>ENGL 104 Composition and Rhetoric</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 202 Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 142 Business Mathematics II</td>
<td>3</td>
</tr>
<tr>
<td>American history (p. 23)</td>
<td>3</td>
</tr>
<tr>
<td>Language, philosophy and culture (p. 21)</td>
<td>3</td>
</tr>
<tr>
<td>Life and physical sciences (p. 20)</td>
<td>3</td>
</tr>
</tbody>
</table>

| Term Semester Credit Hours | 30 |

<table>
<thead>
<tr>
<th>Third Year</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>ACCT 327 Financial Reporting I</td>
<td>3</td>
</tr>
<tr>
<td>FINC 341 Business Finance</td>
<td>3</td>
</tr>
<tr>
<td>MKTG 321 Marketing</td>
<td>3</td>
</tr>
<tr>
<td>SCMT 303 Statistical Methods</td>
<td>3</td>
</tr>
<tr>
<td>International elective</td>
<td>3</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 322 Professional Development Seminar – BBA</td>
<td>1</td>
</tr>
<tr>
<td>ACCT 328 Financial Reporting II</td>
<td>3</td>
</tr>
<tr>
<td>ACCT 329 Cost Management and Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ACCT 421 Critical Communication Skills for Accountants</td>
<td>2</td>
</tr>
<tr>
<td>MGMT 363 Managing People in Organizations</td>
<td>3</td>
</tr>
<tr>
<td>SCMT 364 Operations Management</td>
<td>3</td>
</tr>
</tbody>
</table>

| Term Semester Credit Hours | 60 |

<table>
<thead>
<tr>
<th>Fourth Year</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>ACCT 405 Income Tax</td>
<td>3</td>
</tr>
<tr>
<td>ACCT 427 Accounting and Financial Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 212 Business Law</td>
<td>3</td>
</tr>
<tr>
<td>General electives</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 407 Auditing</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 466 Strategic Management</td>
<td>3</td>
</tr>
<tr>
<td>International elective</td>
<td>3</td>
</tr>
</tbody>
</table>

| Term Semester Credit Hours | 15 |

Management Information Systems: BUAD students intending to major in Management Information Systems must add ISYS 250 Business Programming Logic and Design (3 credits) to sophomore year curriculum in Business (lower level). The creative arts elective or a communication elective can be taken during the junior year.

Business Honors: BUAD students admitted to Business Honors must add (1) BUSN 125 Business Learning Community I (3 credits) to the freshman year curriculum and (2) BUSN 205 Integrated Worklife Competencies (3 credits) to the sophomore year curriculum in Business (lower level). The creative arts elective and a communication elective can be taken during the junior year.

Upper-Level Accounting Program

<table>
<thead>
<tr>
<th>Third Year</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>ACCT 405 Income Tax</td>
<td>3</td>
</tr>
<tr>
<td>ACCT 427 Accounting and Financial Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 212 Business Law</td>
<td>3</td>
</tr>
<tr>
<td>General electives</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 407 Auditing</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 466 Strategic Management</td>
<td>3</td>
</tr>
<tr>
<td>International elective</td>
<td>3</td>
</tr>
</tbody>
</table>
General electives 3

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours: 60

1. Six hours required. A complete list of approved courses is available in the Undergraduate Program Office, Room 238, Wehner Building. In the BBA curricula, the 6 hours of approved international elective courses simultaneously fulfill the University's International and Cultural Diversity Graduation requirement.

2. This course is an approved writing-designated (W) or oral communication (C) business course. See your academic advisor for additional information.

3. General elective courses are open to any course offered for University credit, except ACCT 209, ACCT 210, FINC 409, IBUS 301, ISYS 209, KINE 198, MGMT 209, MGMT 309, MKTG 409, SCMT 309. Additional restrictions may apply: see academic advisor for information. May be taken on a satisfactory/unsatisfactory basis.

No more than 33 hours of accounting courses may be applied toward the undergraduate degree.

See Department of Accounting advisors for more information on the requirements to sit for the CPA examination.

Professional Program students will follow the degree plan coordinated by the Professional Program office.

Professional Program students will substitute ACCT 321 to replace 2 hours of General electives.

**Energy Accounting - Certificate**

The Certificate in Energy Accounting offers Mays students seeking a BBA degree a chance to set themselves apart and find a place in an exciting, competitive industry that provides a wide variety of opportunities – including international experiences. This program is designed to give students high impact learning experiences related to the energy industry. All requirements for the program must be completed prior to graduation. A certificate program notation will be added to the official transcript upon graduation.

**Program Requirements**

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 327 Financial Reporting I</td>
<td></td>
</tr>
<tr>
<td>ACCT 403 Energy Accounting</td>
<td></td>
</tr>
<tr>
<td>or ACCT 603 or Energy Accounting</td>
<td></td>
</tr>
<tr>
<td>ACCT 484 Accounting Internship</td>
<td></td>
</tr>
<tr>
<td>or FINC 484 or Professional Internship</td>
<td></td>
</tr>
<tr>
<td>BUSN 302 Applied Business Competencies</td>
<td>1</td>
</tr>
<tr>
<td>Select one of the following: 1</td>
<td>3</td>
</tr>
<tr>
<td>AGEC 350 Environmental and Natural Resource Economics</td>
<td></td>
</tr>
<tr>
<td>ENGR 101 Energy: Resources, Utilization and Importance to Society</td>
<td></td>
</tr>
<tr>
<td>GEOG 309 Geography of Energy</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours: 13

1. For a complete list of prescribed electives, please contact the Certificate in Energy Accounting coordinator.

**Department of Finance**

The business enterprise must raise capital, use it to maximum advantage, and reward investors. Finance is the set of management challenges (and career opportunities) concerned with succeeding at these tasks.

The finance major involves both required and elective courses in three areas. The area of **Corporate Finance** encompasses tools and techniques for valuing productive assets, choosing ways of funding them, and gauging financial success. In the area of **Investments**, theoretical and practical models help assess risks and rewards of stocks, bonds, derivatives, and other “financial assets” (individually and in portfolios), as well as the financial health of firms and institutions offering them to the investing public. The area of **Markets and Institutions** explores the ways in which bankers, brokers, and other financial institutions convert savings into productive capital.

Mays finance graduates with good academic records place well in all these areas, as well as in graduate and professional schools. They work in industry, on Wall Street, in major banking and consulting firms, and as wealth managers. Accordingly, the Department of Finance emphasizes scholarship in its faculty, professionalism in its programs, and innovation in its relationships with employers and mentors.

The Department of Finance offers three certificate programs for BBA business majors. Each program is designed to complement the student’s degree by providing a concentrated course of study and participation in experiential learning opportunities or internships in the selected area.

**Faculty**

- Bouwman, Christa, Associate Professor
  Finance
  PhD, University of Michigan, 2005

- Chen, Yong, Associate Professor
  Finance
  PhD, Boston College, 2007

- Donnell, Cydney C, Executive Professor
  Finance
  MBA, Southern Methodist University, 1982

- Dye, Richard T, Clinical Professor
  Finance
  PhD, Texas A&M University, 1993

- Elmore, Ed, Senior Lecturer
  Finance
  JD, University of Texas, 1976

- Erturk, Bilal, Visiting Assistant Professor
  Finance
  PhD, Texas A&M University, 2006

- Gaspar, Julian, Clinical Professor
  Finance
  PhD, Georgetown University, 1981

- Guyton, Sally C, Senior Lecturer
  Finance
  MBA, University of Texas, 1982
Hallermann, Detlef, Clinical Associate Professor
Finance
PhD, Colorado School of Mines, 1999

Harris, Britt, Executive Professor
Finance
BA, Texas A&M University, 1980

Hood, Marilynn, Assistant Lecturer
Finance
MBA, Texas A&M University, 1992

Johnson, Shane A, Professor
Finance
PhD, Louisiana State University and A&M College, 1991

Kim, Hwagyun, Assistant Professor
Finance
PhD, University of Chicago, 2003

Kolari, James, Professor
Finance
PhD, Arizona State University, 1980

Kolasinski, Adam C, Associate Professor
Finance
PhD, Massachusetts Institute of Technology, 2006

Liu, Yan, Assistant Professor
Finance
PhD, Duke University, 2014

Mahajan, Arvind, Professor
Finance
PhD, George State University, 1980

Martindale, Lanny R, Senior Lecturer
Finance
JD, South Texas College of Law, 1995

McGrath, Karen, Clinical Assistant Professor
Finance
PhD, University of Reading, 2015

Mohseni, Mahdi, Assistant Professor
Finance
PhD, Boston College, 2015

Moore, Kevin M, Executive Professor
Finance
MBA, The Wharton School, 1994

Peterson, John R, Lecturer
Finance
PhD, Texas A&M University, 2002

Rossi, Marco, Visiting Assistant Professor
Finance
PhD, Pennsylvania State University, 2010

Skeie, David R, Assistant Professor
Finance
PhD, Princeton University, 2004

Sorescu, Sorin M, Professor
Finance
PhD, University of Florida, 1996

Tebeaux, William J, Executive Professor
Finance
MBA, University of Houston, 1971

White, Edward C, Executive Professor
Finance
MBA, University of Hawaii, 1972

Wolken, Lawrence C, Senior Professor
Finance
PhD, Texas A&M University, 1972

Wu, Wei, Assistant Professor
Finance
PhD, University of Chicago, 2015

**Majors**

- Bachelor of Business Administration in Finance (p. 218)

**Certificates**

- Commercial Banking Certificate (p. 220)
- Investment Banking Certificate (p. 220)
- Trading, Risk and Investments Certificate (p. 220)

**Finance - BBA**

**Upper-level Entry Requirements and Application Procedures**

Students who meet the University and college entrance requirements enter Mays Business School in the BUAD (lower-level business) classification. Enrollment of Mays Business School students in junior- and senior-level business courses is limited to those who have been admitted to upper-level (also referred to as upper division) in one of the seven majors (B.B.A.: accounting, business honors, finance, management, management information systems, marketing, and supply chain management) in the college.

The B.B.A. (accounting, business honors, finance, management, management information systems, marketing, and supply chain management) upper-level entry requirements and application procedures are as follows:

1. To be admitted to an upper-level major, a student must be admitted to Mays Business School and must have:
   a. Satisfactorily completed the following five courses:

      - ACCT 229 Introductory Accounting 3
      - ECON 202 Principles of Economics 3
      - ECON 203 Principles of Economics 3
      - MATH 141 Business Mathematics I (or its equivalent) 3
      - MATH 142 Business Mathematics II (or its equivalent) 3

   b. BUAD students apply for upper level no later than the last class day of the semester before they expect to enter upper level. To enter upper level in the summer, all requirements must be completed by the beginning of the first summer session.
c. Unless satisfactorily completed prior to upper-level entry, business students must successfully complete these three remaining lower-level Common Body of Knowledge (CBK) courses at Texas A&M during their first upper-level semester:

- ACCT 230 Introductory Accounting 3
- ISYS 210 Fundamentals of Information Systems 3
- MGMT 211 Legal and Social Environment of Business 3

d. Students are encouraged to complete the freshman and sophomore sequence of courses as listed under Curriculum in Business. BUAD students may pre-register for upper-level business courses in the semester for which they have applied for upper level. However, BUAD students who fail to complete upper-level requirements prior to the start of the semester shall not be permitted to remain registered in upper-level business classes.

2. Transfer students: Transfer students admitted to Mays Business School will be classified as BUAD (lower-level Business) students until they complete all requirements listed previously in item 1, at which time they may apply for admission to an upper-level major field of study. Transfer students may immediately apply for upper-level when admitted to Mays Business School if, and only if, they meet all upper-level requirements at that time.

3. Change of curriculum students: Texas A&M students who change curriculum into Mays Business School from another college or department at the University will be classified as BUAD (lower-level Business) students until they complete all requirements listed previously in item 1. Change of curriculum students who, when admitted to the business school, qualify to apply for admission to upper level may do so.

4. Preference for available seats in junior- and senior-level business courses will be given to students who have been admitted to a degree granting major in Mays Business School. All ineligible students who pre-register for upper-level business classes are subject to cancellation of their registration in these courses.

---

Program Requirements

Lower-Level Business Program

First Year

**Fall**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 141 Business Mathematics I</td>
<td>3</td>
</tr>
<tr>
<td>American history (p. 23)</td>
<td>3</td>
</tr>
<tr>
<td>Communication</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following:

- COMM 203 Public Speaking
- COMM 243 Argumentation and Debate
- ENGL 104 Composition and Rhetoric

| Life and physical sciences (p. 20) | 3 |
| Social and behavioral sciences (p. 23) | 3 |

**Term Semester Credit Hours**: 15

**Spring**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 229 Introductory Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ECON 203 Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>ISYS 210 Fundamentals of Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>POLS 206 American National Government</td>
<td>3</td>
</tr>
<tr>
<td>Communication</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following:

- COMM 203 Public Speaking
- COMM 243 Argumentation and Debate
- ENGL 104 Composition and Rhetoric

| Creative arts (p. 22) | 3 |
| Life and physical sciences (p. 20) | 3 |

**Term Semester Credit Hours**: 15

**Total Semester Credit Hours**: 60

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1. MATH 131, MATH 151 and MATH 171 will be accepted in lieu of MATH 142. MATH 152, MATH 166 and MATH 172 will be accepted in lieu of MATH 141.

2. For those students under ROTC contract, see Requirement 7 of the “Requirements for a Baccalaureate Degree” (p. 24).

Management Information Systems: BUAD students intending to major in Management Information Systems must add ISYS 250 Business Programming Logic and Design (3 credits) to sophomore year curriculum in Business (lower level). The creative arts elective or a communication elective can be taken during the junior year.

Business Honors: BUAD students admitted to Business Honors must add (1) BUSN 125 Business Learning Community I (3 credits) to the freshman year curriculum and (2) BUSN 205 Integrated Worklife Competencies (3 credits) to the sophomore year curriculum in Business (lower level). The creative arts elective and a communication elective can be taken during the junior year.

Upper-Level Finance Program

Third Year

**Fall**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>FINC 341 Business Finance</td>
<td>3</td>
</tr>
<tr>
<td>FINC 350 Ethics in Financial Decision-Making</td>
<td>1</td>
</tr>
<tr>
<td>MGMT 363 Managing People in Organizations</td>
<td>3</td>
</tr>
<tr>
<td>SCMT 303 Statistical Methods</td>
<td>3</td>
</tr>
<tr>
<td>ACCT 315 or ACCT 327</td>
<td>3</td>
</tr>
</tbody>
</table>

**Term Semester Credit Hours**: 13
Spring
FINC 351 Investment Analysis 3
FINC 361 Managerial Finance I 3
FINC 381 Money and Capital Markets 1 3
SCMT 364 Operations Management 3
International elective 2 3

Term Semester Credit Hours 15

Fourth Year
Fall
MKTG 321 Marketing 3
Finance elective (p. 781) 3
Select one of the following:
Accounting elective (p. 591) 4
Finance elective (p. 781) 3
General elective 5
ACCT 316 or ACCT 328 Intermediate Accounting for Non-Accounting Majors II or Financial Reporting II 3

Term Semester Credit Hours 15

Spring
MGMT 466 Strategic Management 3
Finance elective (p. 781) 3
General elective 5
International elective 2 3

Total Semester Credit Hours: 60

1 This course is an approved writing-designated (W) or oral communication (C) business course. See your academic advisor for additional information.
2 Six hours required. A complete list of approved courses is available in the Undergraduate Program Office, Room 238, Wehner Building. In the BBA curricula, the 6 hours of approved international elective courses simultaneously fulfill the University's International and Cultural Diversity Graduation requirement.
3 Any 300- or 400-level finance course except FINC 341, FINC 350, FINC 409, and FINC 484.
4 Any 300- or 400-level accounting course except ACCT 315, ACCT 316, ACCT 327, and ACCT 328. Before enrolling in ACCT 489, students should consult with the finance department advisor.
5 Elective courses are open to any course offered for University credit, except ACCT 209, ACCT 210, FINC 409, IBUS 301, ISYS 209, KINE 198, MGMT 209, MGMT 309, MKTG 409, SCMT 309. Additional restrictions may apply: see academic advisor for information. May be taken on a satisfactory/unsatisfactory basis.

Commercial Banking - Certificate

The Commercial Banking Program (CBP) is designed to equip students with the banking and finance skills needed to transition to banking careers and serve the personnel needs of banking organizations in the state of Texas and the United States. The program requires completion of prescribed coursework and a paid summer internship with a member bank. Business students must be U.S. citizens or permanent residents.

Program Requirements

FINC 447/ Financial Statement Analysis 3
ACCT 447
FINC 462 Commercial Bank Management 3
FINC 463 Seminar in Commercial Banking 3
FINC 475 Real Estate Investment Analysis 3

Total Semester Credit Hours 12

Investment Banking - Certificate

The educational objectives of the program are to acquaint each participant with the fundamentals of valuing publicly and privately held firms, underwriting public and private offerings of debt and equity securities, managing capital market risks, complying with SEC and NASD regulations, and managing other financial services commonly offered by investment banks.

Program Requirements

ACCT 327 Financial Reporting I 3
or ACCT 315 or Intermediate Accounting for Non-Accounting Majors I
FINC 443 Valuation 3
FINC 465 Seminar in Investment Banking 3
FINC 466 Wall Street, Investment Banking and the Financial Markets 3
Select one of the following: 3
FINC 422 Applied Investment Analysis
FINC 423 Options and Financial Futures
FINC 424 Trading Risk Management
FINC 425 Active Portfolio Management
FINC 427 Titans of Investing
FINC 428 Fixed Income Analysis
FINC 448 Advanced Investments
FINC 449 Financial Modeling

Total Semester Credit Hours 15

Trading, Risk and Investments - Certificate

The Trading, Risk and Investments Program (TRIP) prepares students in the fields of trading, investments and risk management by combining exceptional class instruction with hands-on internship-based experience. Two paid internships with different board member companies are required. Business students must be U.S. citizens or permanent residents.

Program Requirements

ACCT 327 Financial Reporting I 3
BUSN 392 Cooperative Education in Business (Two 2-hour terms) 4
FINC 368 Trade Floor Dynamics 3
FINC 485 Directed Studies ((Final Presentation)) 1
Select three of the following: 

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>FINC 422</td>
<td>Applied Investment Analysis</td>
</tr>
<tr>
<td>FINC 423</td>
<td>Options and Financial Futures</td>
</tr>
<tr>
<td>FINC 424</td>
<td>Trading Risk Management</td>
</tr>
<tr>
<td>FINC 425</td>
<td>Active Portfolio Management</td>
</tr>
<tr>
<td>FINC 427</td>
<td>Titans of Investing</td>
</tr>
<tr>
<td>FINC 428</td>
<td>Fixed Income Analysis</td>
</tr>
<tr>
<td>FINC 443</td>
<td>Valuation</td>
</tr>
<tr>
<td>FINC 446</td>
<td>Technical Analysis of Financial Markets</td>
</tr>
<tr>
<td>FINC 448</td>
<td>Advanced Investments</td>
</tr>
<tr>
<td>FINC 449</td>
<td>Financial Modeling</td>
</tr>
<tr>
<td>FINC 466</td>
<td>Wall Street, Investment Banking and the Financial Markets</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 20

Department of Information and Operations Management

The Department of Information and Operations Management offers two undergraduate degrees: a BBA degree in Management Information Systems (MISY) and a BBA degree in Supply Chain Management (SCMT). In each degree program, students learn how to use technology to make businesses more efficient, effective, and competitive. Coursework includes both the technical and managerial aspects of MISY and SCMT to ensure that students are well-equipped for successful careers in the dynamic, global business environment.

A list of recommended courses for each degree is available from the Department of Information and Operations Management undergraduate advisors (Room 330, Wehner Building).

Faculty

Abbey, James D, Assistant Professor
Information & Operations Mgmt
PhD, Pennsylvania State University, 2013

Arreola-Risa, Antonio, Associate Professor
Information & Operations Mgmt
PhD, Stanford University, 1989

Arunugam, Ranganathan, Lecturer
Information & Operations Mgmt
MS, University of Kentucky, 2003

Becker, Aaron C, Clinical Assistant Professor
Information & Operations Mgmt
PhD, University of Oklahoma, 2009

Boone, Edward F, Lecturer
Information & Operations Mgmt
MS, Pennsylvania State University, 2000
MBA, University of Delaware, 1994

Choobineh, Joobin, Associate Professor
Information & Operations Mgmt
PhD, University of Arizona, 1985

Curtsinger, Wanda F, Lecturer
Information & Operations Mgmt
MS, Morehead State U., 2007

Darcey, Louise W, Senior Lecturer
Information & Operations Mgmt
MS, Texas A&M University, 1974

Geismar, Harry N, Associate Professor
Information & Operations Mgmt
PhD, University of Texas, Dallas, 2003

Heim, Gregory R, Associate Professor
Information & Operations Mgmt
PhD, University of Minnesota, 2000

Jamieson, Thomas V, Executive Professor
Information & Operations Mgmt
PhD, Texas A&M University, 1978

Jasperson, Jon L, Clinical Associate Professor
Information & Operations Mgmt
PhD, Florida State University, 1999

Johnson, Robert E, Clinical Associate Professor
Information & Operations Mgmt
PhD, University of Rochester, 1989

Ketzenberg, Michael E, Associate Professor
Information & Operations Mgmt
PhD, University of North Carolina at Chapel Hill, 2000

Koufteros, Xenophon, Associate Professor
Information & Operations Mgmt
PhD, University of Toledo, 1995

Kumar, Subodha, Associate Professor
Information & Operations Mgmt
PhD, University of Texas, Dallas, 2001

Li, Ying, Clinical Assistant Professor
Information & Operations Mgmt
PhD, University of Michigan, 2005

Manley, Matthew T, Clinical Assistant Professor
Information & Operations Mgmt
PhD, Utah State University, 2012

Metters, Richard D, Professor
Information & Operations Mgmt
PhD, University of North Carolina at Chapel Hill, 1993

Oliva, Rogelio, Associate Professor
Information & Operations Mgmt
PhD, Massachusetts Institute of Technology, 1996

Pappu, Madhav, Clinical Assistant Professor
Information & Operations Mgmt
PhD, University of Tennessee, 1999

Perdikaki, Olga, Assistant Professor
Information & Operations Mgmt
PhD, University of North Carolina at Chapel Hill, 2009
Phinney, Theresa M, Senior Lecturer
Information & Operations Mgmt
MCS, Texas A&M University, 1984

Rangan, Sudarsan, Clinical Assistant Professor
Information & Operations Mgmt
PhD, University of Alabama, 2008

Sen, Arun, Professor
Information & Operations Mgmt
PhD, Pennsylvania State University, 1979

Sen, Ravi, Associate Professor
Information & Operations Mgmt
PhD, University of Illinois at Urbana-Champaign, 2003

Shetty, Bala, Professor
Information & Operations Mgmt
PhD, Southern Methodist University, 1985

Sriskandarajah, Chelliah, Professor
Information & Operations Mgmt
PhD, L’Institut National Polytechnique de Grenoble, 1986

Starnes, Robin C, Executive Professor
Information & Operations Mgmt
MS, Texas A&M University, 1981

Sun, Haoying, Assistant Professor
Information & Operations Mgmt
PhD, University of Texas, Austin, 2011

Toso De Araujo, Andre Luis, Clinical Assistant Professor
Information & Operations Mgmt
PhD, University of Oklahoma, 2004

Walsh, Colleen S, Lecturer
Information & Operations Mgmt
JD, University of Houston, 2007
JD, University of Houston, 2007

Whitcomb, Della K, Senior Lecturer
Information & Operations Mgmt
MS, Texas A&M University, 1998

Whitten, Gary D, Clinical Associate Professor
Information & Operations Mgmt
PhD, Louisiana Tech University, 2004

Majors

- Bachelor of Business Administration in Management Information Systems (p. 222)
- Bachelor of Business Administration in Supply Chain Management (p. 224)

Management Information Systems - BBA

The Management Information Systems major produces graduates who are both business analysts (i.e., professionals who understand accounting, marketing, finance, etc.) and information system specialists (i.e., professionals who can implement information systems strategies). Graduates of the program possess the business, technical, and leadership skills to meet the challenges presented by rapidly evolving information technology and the need to effectively incorporate this technology into business strategy and day-to-day operations.

Upper-level Entry Requirements and Application Procedures

Students who meet the University and college entrance requirements enter Mays Business School in the BUAD (lower-level business) classification. Enrollment of Mays Business School students in junior- and senior-level business courses is limited to those who have been admitted to upper-level (also referred to as upper division) in one of the seven majors (B.B.A.: accounting, business honors, finance, management, management information systems, marketing, and supply chain management) in the college.

The B.B.A. (accounting, business honors, finance, management information systems, marketing, and supply chain management) upper-level entry requirements and application procedures are as follows:

1. To be admitted to an upper-level major, a student must be admitted to Mays Business School and must have:
   a. Satisfactorily completed the following five courses:
      - ACCT 229 Introductory Accounting 3
      - ECON 202 Principles of Economics 3
      - ECON 203 Principles of Economics 3
      - MATH 141 Business Mathematics I (or its equivalent) 3
      - MATH 142 Business Mathematics II (or its equivalent) 3
   b. BUAD students apply for upper level no later than the last class day of the semester before they expect to enter upper level. To enter upper level in the summer, all requirements must be completed by the beginning of the first summer session.
   c. Unless satisfactorily completed prior to upper-level entry, business students must successfully complete these three remaining lower-level Common Body of Knowledge (CBK) courses at Texas A&M during their first upper-level semester:
      - ACCT 230 Introductory Accounting 3
      - ISYS 210 Fundamentals of Information Systems 3
      - MGMT 211 Legal and Social Environment of Business 3
   d. Students are encouraged to complete the freshman and sophomore sequence of courses as listed under Curriculum in Business. BUAD students may pre-register for upper-level business courses in the semester for which they have applied for upper level. However, BUAD students who fail to complete upper-level requirements prior to the start of the semester shall not be permitted to remain registered in upper-level business classes.

2. Transfer students: Transfer students admitted to Mays Business School will be classified as BUAD (lower-level Business) students until they complete all requirements listed previously in item 1, at which time they may apply for admission to an upper-level major field of study. Transfer students may immediately apply for upper-level when admitted to Mays Business School if, and only if, they meet all upper-level requirements at that time.

3. Change of curriculum students: Texas A&M students who change curriculum into Mays Business School from another college or department at the University will be classified as BUAD (lower-level Business) students until they complete all requirements listed previously in item 1. Change of curriculum students who, when
admitted to the business school, qualify to apply for admission to upper level may do so.

4. Preference for available seats in junior- and senior-level business courses will be given to students who have been admitted to a degree-granting major in Mays Business School. All ineligible students who pre-register for upper-level business classes are subject to cancellation of their registration in these courses.

Program Requirements
Lower-Level Business Program

First Year
Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 141 Business Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>American history (p. 23)</td>
<td>3</td>
</tr>
<tr>
<td>Communication</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
</tr>
<tr>
<td>COMM 203 Public Speaking</td>
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<tr>
<td>COMM 243 Argumentation and Debate</td>
<td></td>
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<tr>
<td>ENGL 104 Composition and Rhetoric</td>
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</tr>
<tr>
<td>Life and physical sciences (p. 20)</td>
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</tr>
<tr>
<td>Social and behavioral science (p. 23)</td>
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<tr>
<td><strong>Term Semester Credit Hours</strong></td>
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Spring

<table>
<thead>
<tr>
<th>Course</th>
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<tr>
<td>ECON 202 Principles of Economics</td>
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<tr>
<td>MATH 142 Business Mathematics II</td>
<td>3</td>
</tr>
<tr>
<td>American history (p. 23)</td>
<td>3</td>
</tr>
<tr>
<td>Language, philosophy and culture (p. 21)</td>
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<tr>
<td><strong>Term Semester Credit Hours</strong></td>
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Second Year
Fall

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>ACCT 229 Introductory Accounting</td>
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<tr>
<td>ECON 203 Principles of Economics</td>
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</tr>
<tr>
<td>ISYS 210 Fundamentals of Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>POLS 206 American National Government</td>
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<tr>
<td>Communication</td>
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<tr>
<td>Select one of the following:</td>
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<tr>
<td>COMM 203 Public Speaking</td>
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<tr>
<td>COMM 243 Argumentation and Debate</td>
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</tr>
<tr>
<td>ENGL 104 Composition and Rhetoric</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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Spring

<table>
<thead>
<tr>
<th>Course</th>
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</thead>
<tbody>
<tr>
<td>ACCT 230 Introductory Accounting</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 211 Legal and Social Environment of Business</td>
<td>3</td>
</tr>
<tr>
<td>POLS 207 State and Local Government</td>
<td>3</td>
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<tr>
<td>ISYS 250 Business Programming Logic and Design</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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</table>

Total Semester Credit Hours: 60

Management Information Systems Program

Third Year
Fall

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>ISYS 281 Professional Development Information Systems Seminar</td>
<td>1</td>
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<tr>
<td>ISYS 300/SCMT Business Communications I</td>
<td>1</td>
</tr>
<tr>
<td>ISYS 310 Network Communications and Infrastructure</td>
<td>3</td>
</tr>
<tr>
<td>ISYS 320 Business Systems Analysis and Design</td>
<td>3</td>
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<td>SCMT 303 Statistical Methods</td>
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<td>SCMT 364 Operations Management</td>
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Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ISYS 315 Database Programming</td>
<td>3</td>
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<tr>
<td>ISYS 400/SCMT Business Communications II</td>
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<td>ISYS 410 Management of Information Systems</td>
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<td>ISYS 481 Information Systems Seminar</td>
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<td>MKTG 321 Marketing</td>
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<td>International elective</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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Fourth Year
Fall

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>FINC 341 Business Finance</td>
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<tr>
<td>ISYS 415 Information Systems Capstone Project</td>
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</tr>
<tr>
<td>ISYS 481 Information Systems Seminar</td>
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</tr>
<tr>
<td>MGMT 363 Managing People in Organizations</td>
<td>3</td>
</tr>
<tr>
<td>MISY Directed elective</td>
<td>3</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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General elective 5  

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<tr>
<th>Term Semester Credit Hours</th>
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<tbody>
<tr>
<td>Spring</td>
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<tr>
<td>MGMT 466 Strategic Management</td>
<td>3</td>
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<tr>
<td>MISTRY Directed elective 4</td>
<td>3</td>
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<tr>
<td>Creative arts (p. 22)</td>
<td>3</td>
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<tr>
<td>General elective 5</td>
<td>4</td>
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<tr>
<td>International elective 3</td>
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</table>

<table>
<thead>
<tr>
<th>Term Semester Credit Hours</th>
<th>16</th>
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</thead>
</table>

Total Semester Credit Hours: 60

1. ISYS 281 and ISYS 481 are cross-listed courses. Students must take three semesters of ISYS 281/481 for a total of three credits.
2. This course is an approved writing-designated (W) or oral communication (C) business course. See your academic advisor for additional information.
3. A complete list of approved courses is available in the Undergraduate Program Office, 238 Wehner Building. The six required hours simultaneously fulfill the University’s International and Cultural Diversity Graduation requirement.
4. Select in consultation with an information and operations management academic advisor. A list of acceptable courses is available in the Undergraduate Program Office, Room 238, Wehner Building, or in the department academic advising office.
5. Elective courses are open to any course offered for University credit, except ACCT 209, ACCT 210, FINC 409, IBUS 301, ISYS 209, KINE 198, MGMT 209, MGMT 309, MKTG 409, SCMT 309. Additional restrictions may apply; see academic advisor for information. May be taken on a satisfactory/unsatisfactory basis.

Supply Chain Management - BBA

The Supply Chain Management major prepares students for careers in designing and managing the activities that deliver products and services to customers. Supply chain activities add direct value to the customer and leadership skills needed to meet the challenges of the rapidly evolving global marketplace.

Upper-level Entry Requirements and Application Procedures

Students who meet the University and college entrance requirements enter Mays Business School in the BUAD (lower-level business) classification. Enrollment of Mays Business School students in junior- and senior-level business courses is limited to those who have been admitted to upper-level (also referred to as upper division) in one of the seven majors (B.B.A.: accounting, business honors, finance, management, management information systems, marketing, and supply chain management) in the college.

The B.B.A. (accounting, business honors, finance, management, management information systems, marketing, and supply chain management) upper-level entry requirements and application procedures are as follows:

1. To be admitted to an upper-level major, a student must be admitted to Mays Business School and must have:
   a. Satisfactorily completed the following five courses:
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      - ECON 202 Principles of Economics 3
      - ECON 203 Principles of Economics 3
      - MATH 141 Business Mathematics I (or its equivalent) 3
      - MATH 142 Business Mathematics II (or its equivalent) 3
   b. BUAD students apply for upper level no later than the last class day of the semester before they expect to enter upper level. To enter upper level in the summer, all requirements must be completed by the beginning of the first summer session.
   c. Unless satisfactorily completed prior to upper-level entry, business students must successfully complete these three remaining lower-level Common Body of Knowledge (CBK) courses at Texas A&M during their first upper-level semester:
      - ACCT 230 Introduction to Accounting 3
      - ISYS 210 Fundamentals of Information Systems 3
      - MGMT 211 Legal and Social Environment of Business 3
   d. Students are encouraged to complete the freshman and sophomore sequence of courses as listed under Curriculum in Business. BUAD students may pre-register for upper-level business courses in the semester for which they have applied for upper level. However, BUAD students who fail to complete upper-level requirements prior to the start of the semester shall not be permitted to remain registered in upper-level business classes.

2. Transfer students: Transfer students admitted to Mays Business School will be classified as BUAD (lower-level Business) students until they complete all requirements listed previously in item 1, at which time they may apply for admission to an upper-level major field of study. Transfer students may immediately apply for upper-level when admitted to Mays Business School if, and only if, they meet all upper-level requirements at that time.

3. Change of curriculum students: Texas A&M students who change curriculum into Mays Business School from another college or department at the University will be classified as BUAD (lower-level Business) students until they complete all requirements listed previously in item 1. Change of curriculum students who, when admitted to the business school, qualify to apply for admission to upper level may do so.

4. Preference for available seats in junior- and senior-level business courses will be given to students who have been admitted to a degree granting major in Mays Business School. All ineligible students who pre-register for upper-level business classes are subject to cancellation of their registration in these courses.

Program Requirements

Lower-Level Business Program

First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>MATH 141 Business Mathematics I 1</td>
<td>3</td>
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<tr>
<td>American history (p. 23)</td>
<td>3</td>
</tr>
<tr>
<td>Communication</td>
<td>3</td>
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</table>
Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Term</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
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<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
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<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td></td>
<td></td>
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</tbody>
</table>

Life and physical sciences (p. 20) 3
Social and behavioral sciences (p. 23) 3

Term Semester Credit Hours 15

Spring
ECON 202 Principles of Economics 3
MATH 142 Business Mathematics II 3
American history (p. 23) 3
Language, philosophy and culture (p. 21) 3
Life and physical sciences (p. 20) 3

Term Semester Credit Hours 15

Second Year
Fall
ACCT 229 Introductory Accounting 3
ECON 203 Principles of Economics 3
ISYS 210 Fundamentals of Information Systems 3
POLS 206 American National Government 3
Communication
Select one of the following:
COMM 203 Public Speaking
COMM 243 Argumentation and Debate
ENGL 104 Composition and Rhetoric

Term Semester Credit Hours 15

Spring
ACCT 230 Introductory Accounting 3
MGMT 211 Legal and Social Environment of Business 3
POLS 207 State and Local Government 3
Creative arts (p. 22) 3
Life and physical sciences (p. 20) 3

Term Semester Credit Hours 15

Total Semester Credit Hours: 60

Upper-Level Supply Chain Management Program

Third Year

Term Semester Credit Hours 15

Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>MGMT 363</td>
<td>Managing People in Organizations</td>
<td>3</td>
</tr>
<tr>
<td>MKTG 321</td>
<td>Marketing</td>
<td>3</td>
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<tr>
<td>SCMT 303</td>
<td>Statistical Methods</td>
<td>3</td>
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<tr>
<td>SCMT 364</td>
<td>Operations Management</td>
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<td>General elective 1</td>
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Spring

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>FINC 341</td>
<td>Business Finance</td>
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<tr>
<td>SCMT 340</td>
<td>Supply Chain Management</td>
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<tr>
<td>SCMT 361</td>
<td>Operations Planning and Control</td>
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<tr>
<td>SCMT Directed elective (p. 966) 2</td>
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<td>International elective 3</td>
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Term Semester Credit Hours 15

Fourth Year

Term Semester Credit Hours 15

Fall

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>SCMT 300/ISYS 300</td>
<td>Business Communications I 4</td>
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<td>SCMT 335</td>
<td>Sourcing and Procurement</td>
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<td>SCMT 345</td>
<td>Business Process Design</td>
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<td>SCMT 400/ISYS 400</td>
<td>Business Communication II 4</td>
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<td>General elective 1</td>
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Spring

<table>
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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>MGMT 466</td>
<td>Strategic Management</td>
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<td>SCMT 465</td>
<td>Information Technology for Supply Chain Management</td>
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<td>SCMT Directed elective (p. 966) 2</td>
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<td>General elective 1</td>
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<tr>
<td>International elective 3</td>
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</table>

Term Semester Credit Hours 15

Total Semester Credit Hours: 60

1. Elective courses are open to any course offered for University credit, except ACCT 209, ACCT 210, FINC 409, IBUS 301, ISYS 209, KINE 198, MGMT 209, MGMT 309, MKTG 409, SCMT 309. Additional restrictions may apply: see academic advisor for information. May be taken on a satisfactory/unsatisfactory basis.

2. Select in consultation with an information and operations management academic advisor. A list of acceptable courses is available in the Undergraduate Program Office, Room 238, Wehner Building, or in the department academic advising office.

Management Information Systems: BUAD students intending to major in Management Information Systems must add ISYS 250 Business Programming Logic and Design (3 credits) to sophomore year curriculum in Business (lower level). The creative arts elective or a communication elective can be taken during the junior year.

Business Honors: BUAD students admitted to Business Honors must add (1) BUSN 125 Business Learning Community I (3 credits) to the freshman year curriculum and (2) BUSN 205 Integrated Worklife Competencies (3 credits) to the sophomore year curriculum in Business (lower level). The creative arts elective and a communication elective can be taken during the junior year.
A complete list of approved courses is available in the Undergraduate Program Office, 238 Wehner Building. The six required hours simultaneously fulfill the University’s International and Cultural Diversity Graduation requirement.

This course is an approved writing-designated (W) or oral communication (C) business course. See your academic advisor for additional information.

Department of Management

The BBA in Management offers a broad range of career opportunities. A management student develops the ability to plan, organize, make decisions, communicate, and lead effectively in a variety of work settings. Written and verbal communication, teamwork, and problem solving are emphasized.

Through directed electives, students will focus their studies in one of the five following areas.

- **Consulting and General Management** - This track will appeal to students interested in problem-solving and helping individuals or organizations as they maneuver the business environment, whether the student anticipates working in the consulting industry or in any managerial role.

- **Entrepreneurial Leadership** - Designed for students interested in learning the entrepreneurial process, the role of creativity in identifying and/or developing entrepreneurial opportunities, the elements of a business plan, and the leadership practices associated with successful organizations.

- **Human Resource Management** - A career in human resources allows HR professionals to engage in the strategic management of an organization’s human capital. HR professionals develop and implement workplace policies and initiatives regarding employee recruiting, selection, compensation, training & development, performance management, career planning, and employee & labor relations.

- **Nonprofit Management** - For students seeking to invest themselves in a mission beyond profit-making and into the realm of social change for charitable, educational, religious, scientific, and other “public good” causes and organizations.

- **Pre-Law** - This track will expose students to opportunities that combine law and business, and could include careers in corporate law, international affairs, public policy, and conflict resolution, to name a few. Many students in this track will pursue a law or other advanced degree.

Combining theory and application both inside and outside the classroom allows the student to obtain the knowledge and competencies sought by and readily applied in organizations such as consulting firms, Fortune 500 companies, retail and services industries, nonprofit and charitable entities, governmental agencies, new ventures, and family businesses.

The Management major allows the student to select from a variety of jobs, organizations and industries. It also provides a solid foundation for pursuing graduate studies in business, law, and a variety of other disciplines.

**Faculty**

Barrick, Murray R, Distinguished Professor  
Management  
PhD, University of Akron, The, 1988

Baxter, Jerry D, Executive Professor  
Management  
MBA, Georgia State University, 1996

Bierman, Leonard, Professor  
Management  
JD, University of Pennsylvania, 1978

Boivie, Steven R, Associate Professor  
Management  
PhD, University of Texas, Austin, 2006

Boswell, Wendy R, Professor  
Management  
PhD, Cornell University, 2000

Buenger, Victoria L, Clinical Professor  
Management  
PhD, Texas A&M University, 1990

Chiaburu, Dan S, Associate Professor  
Management  
PhD, Pennsylvania State University, 2009

Courtright, Stephen H, Assistant Professor  
Management  
PhD, University of Iowa, 2012

Devers, Cynthia, Associate Professor  
Management  
PhD, Michigan State University, 2003

Eden, Lorraine A, Professor  
Management  
PhD, Dalhousie University, 1976

Elmore, Otis E, Senior Lecturer  
Management  
JD, University of Texas, Austin, 1976

Fitza, Markus A, Assistant Professor  
Management  
PhD, University of Colorado, 2010

Flint, Gerald D, Clinical Associate Professor  
Management  
PhD, Texas A&M University, 1997

Griffin, Ricky W, Distinguished Professor  
Management  
PhD, University of Houston, 1978

Hailey, Camille E, Senior Lecturer  
Management  
JD, South Texas College of Law, 1993

Howard, Michael D, Assistant Professor  
Management  
PhD, University of Washington, 2012
Ireland, Robert D, Distinguished Professor  
Management  
PhD, Texas Tech University, 1977

King-Metters, Kathryn H, Executive Professor  
Management  
PhD, Capella University, 2007

Koufteros, Beth A, Senior Lecturer  
Management  
PhD, Bowling Green State University, 1992

Lester, Richard H, Clinical Professor  
Management  
PhD, Texas A&M University, 2003

Lewis, Donald H, Executive Professor  
Management  
MBA, Texas A&M International University, 1992

Mahajan, Vanita, Senior Lecturer  
Management  
MBA, Texas A&M University, 1986

Paetzold, Ramona L, Professor  
Management  
JD, University of Nebraska, 1990  
PhD, Indiana University, 1979

Panina, Daria, Clinical Associate Professor  
Management  
PhD, Rutgers University, 2002

Pustay, Michael W, Professor  
Management  
PhD, Yale University, 1973

Schleicher, Deidra J, Associate Professor  
Management  
PhD, Pennsylvania State University, 1998

Shetty, Bharathi S, Lecturer  
Management  
MS, Texas A&M University, 2009

Steele, Adam P, Lecturer  
Management  
PhD, University of Virginia, 2011

Swim, Keith D, Clinical Associate Professor  
Management  
JD, Texas Tech University, 1980

Tihanyi, Laszlo, Professor  
Management  
PhD, Texas A&M University, 1996

Watt, John D, Clinical Associate Professor  
Management  
PhD, Kansas State University, 2002

Wesson, Liesl S, Senior Lecturer  
Management  
MS, Texas A&M University, 1992

Wesson, Michael J, Associate Professor  
Management  
PhD, Michigan State University, 2002

Withers, Michael C, Assistant Professor  
Management  
PhD, Arizona State University, 2011

Woodman, Richard W, Professor  
Management  
PhD, Purdue University, 1978

Zapata, Cindy P, Associate Professor  
Management  
PhD, University of Florida, 2008

Zardkoohi, Asghar, Professor  
Management  
PhD, Virginia Polytechnic Institute and State University, 1977

**Majors**

- Bachelor of Business Administration in Management (p. 227)

**Certificates**

- Entrepreneurial Leadership Certificate (p. 229)

**Management - BBA**

**Upper-level Entry Requirements and Application Procedures**

Students who meet the University and college entrance requirements enter Mays Business School in the BUAD (lower-level business) classification. Enrollment of Mays Business School students in junior- and senior-level business courses is limited to those who have been admitted to upper-level (also referred to as upper division) in one of the seven majors (B.B.A.: accounting, business honors, finance, management, management information systems, marketing, and supply chain management) in the college.

The B.B.A. (accounting, business honors, finance, management, management information systems, marketing, and supply chain management) upper-level entry requirements and application procedures are as follows:

1. To be admitted to an upper-level major, a student must be admitted to Mays Business School and must have:
   a. Satisfactorily completed the following five courses:
      
      | Course       | Title                        | Credits |
      |--------------|------------------------------|---------|
      | ACCT 229     | Introductory Accounting      | 3       |
      | ECON 202     | Principles of Economics      | 3       |
      | ECON 203     | Principles of Economics      | 3       |
      | MATH 141     | Business Mathematics I (or its equivalent) | 3   |
      | MATH 142     | Business Mathematics II (or its equivalent) | 3   |
   b. BUAD students apply for upper level no later than the last class day of the semester before they expect to enter upper level. To enter upper level in the summer, all requirements must be completed by the beginning of the first summer session.
   c. Unless satisfactorily completed prior to upper-level entry, business students must successfully complete these three remaining lower-level Common Body of Knowledge (CBK) courses at Texas A&M during their first upper-level semester:
2. Transfer students: Transfer students admitted to Mays Business School will be classified as BUAD (lower-level Business) students until they complete all requirements listed previously in item 1, at which time they may apply for admission to an upper-level major field of study. Transfer students may immediately apply for upper-level when admitted to Mays Business School if, and only if, they meet all upper-level requirements at that time.

3. Change of curriculum students: Texas A&M students who change curriculum into Mays Business School from another college or department at the University will be classified as BUAD (lower-level Business) students until they complete all requirements listed previously in item 1. Change of curriculum students who, when admitted to the business school, qualify to apply for admission to upper level may do so.

4. Preference for available seats in junior- and senior-level business courses will be given to students who have been admitted to a degree granting major in Mays Business School. All ineligible students who pre-register for upper-level business classes are subject to cancellation of their registration in these courses.

Program Requirements

Lower-Level Business Program

First Year

Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 141 Business Mathematics I 1</td>
<td>3</td>
</tr>
<tr>
<td>American history (p. 23) 2</td>
<td>3</td>
</tr>
<tr>
<td>Communication</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
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<tr>
<td>COMM 203 Public Speaking</td>
<td></td>
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<tr>
<td>COMM 243 Argumentation and Debate</td>
<td></td>
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<tr>
<td>ENGL 104 Composition and Rhetoric</td>
<td></td>
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<tr>
<td>Life and physical sciences (p. 20)</td>
<td></td>
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<tr>
<td>Social and behavioral sciences (p. 23)</td>
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</tbody>
</table>

Term Semester Credit Hours: 15

Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ECON 202 Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 142 Business Mathematics II 1</td>
<td>3</td>
</tr>
<tr>
<td>American history (p. 23) 2</td>
<td>3</td>
</tr>
<tr>
<td>Language, philosophy and culture (p. 21)</td>
<td></td>
</tr>
<tr>
<td>Life and physical sciences (p. 20)</td>
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</table>

Term Semester Credit Hours: 15

Second Year

Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>ACCT 229 Introductory Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ECON 203 Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>ISYS 210 Fundamentals of Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>POLS 206 American National Government 2</td>
<td>3</td>
</tr>
<tr>
<td>Communication</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
</tr>
<tr>
<td>COMM 203 Public Speaking</td>
<td></td>
</tr>
<tr>
<td>COMM 243 Argumentation and Debate</td>
<td></td>
</tr>
<tr>
<td>ENGL 104 Composition and Rhetoric</td>
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</tr>
</tbody>
</table>

Term Semester Credit Hours: 15

Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ACCT 230 Introductory Accounting</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 211 Legal and Social Environment of Business</td>
<td>3</td>
</tr>
<tr>
<td>POLS 207 State and Local Government 2</td>
<td>3</td>
</tr>
<tr>
<td>Creative arts (p. 22)</td>
<td>3</td>
</tr>
<tr>
<td>Life and physical sciences (p. 20)</td>
<td></td>
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</tbody>
</table>

Total Semester Credit Hours: 60

1 MATH 131, MATH 151 and MATH 171 will be accepted in lieu of MATH 142. MATH 152, MATH 166 and MATH 172 will be accepted in lieu of MATH 141.

2 For those students under ROTC contract, see Requirement 7 of the "Requirements for a Baccalaureate Degree" (p. 24).

Management Information Systems: BUAD students intending to major in Management Information Systems must add ISYS 250 Business Programming Logic and Design (3 credits) to sophomore year curriculum in Business (lower level). The creative arts elective or a communication elective can be taken during the junior year.

Business Honors: BUAD students admitted to Business Honors must add (1) BUSN 125 Business Learning Community I (3 credits) to the freshman year curriculum and (2) BUSN 205 Integrated Worklife Competencies (3 credits) to the sophomore year curriculum in Business (lower level). The creative arts elective and a communication elective can be taken during the junior year.

Upper-Level Management Program

Third Year

Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ECON 322 or Applied Microeconomic Theory or</td>
<td>3</td>
</tr>
<tr>
<td>ECON 323 Microeconomic Theory</td>
<td></td>
</tr>
<tr>
<td>MGMT 363 Managing People in Organizations</td>
<td></td>
</tr>
<tr>
<td>MKTG 321 Marketing</td>
<td>3</td>
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<tr>
<td>SCMT 303 Statistical Methods</td>
<td></td>
</tr>
<tr>
<td>International elective 1</td>
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</table>

Term Semester Credit Hours: 15

Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>FINC 341 Business Finance</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 373 Managing Human Resources 2</td>
<td>3</td>
</tr>
</tbody>
</table>

Term Semester Credit Hours: 15
Mgmt 450/iBus 450  International Environment of Business 1  3
Scmt 364  Operations Management  3
General elective 3  3

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Fourth Year</td>
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<td></td>
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<tr>
<td>Fall</td>
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<td></td>
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<tr>
<td>Mgmt 439  Negotiations</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Mgmt directed elective 2,4</td>
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<td>3</td>
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<td>Mgmt directed elective 4</td>
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<td>3</td>
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<tr>
<td>Business elective 5</td>
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<td>3</td>
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<tr>
<td>Data analysis elective 6</td>
<td></td>
<td>3</td>
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<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mgmt 466  Strategic Management</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Mgmt directed elective 4</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Mgmt directed elective 4</td>
<td></td>
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<tr>
<td>General elective 3</td>
<td></td>
<td>6</td>
</tr>
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<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Total Semester Credit Hours</td>
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<td>60</td>
</tr>
</tbody>
</table>

Entreprenurial Leadership - Certificate

The Certificate in Entrepreneurial Leadership offers Mays Business School students seeking a BBA or BS (Agribusiness) degree the opportunity to study entrepreneurship in a focused set of courses. Students who pursue the certificate program must complete all requirements prior to graduation.

Designed to develop competencies needed to successfully create and manage new ventures or to be a driver of innovation within existing enterprises, emphasis is placed on leadership in three areas: conceiving, exploiting, and managing opportunities. Graduates of this program are provided with the tools to plan for new business start-ups, to become leaders in high growth firms, or to become corporate "intrapreneurs" capable of improving an organization’s ability to innovate.

Program Requirements

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mgmt 440</td>
<td>Creativity and Innovation in Business</td>
<td>3</td>
</tr>
<tr>
<td>Mgmt 461</td>
<td>Entrepreneurship and New Ventures</td>
<td>3</td>
</tr>
<tr>
<td>Mgmt 489</td>
<td>Special Topics in...</td>
<td>1</td>
</tr>
<tr>
<td>Mgmt 475</td>
<td>Leadership Development</td>
<td>3</td>
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</table>

Select one of the following: 3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>Mgmt 470</td>
<td>Entrepreneurial Small Business</td>
</tr>
<tr>
<td>Mgmt 457</td>
<td>Global Entrepreneurship</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 13

Department of Marketing

Marketing involves developing goods and services to satisfy customers’ needs and then making them available at the right places, at the right times and at competitive prices. Marketing also provides information to help customers decide whether specific goods and services will meet their needs.

Recent changes in social and economic systems have created new challenges for marketing professionals. Increasingly, they must focus on both domestic and global opportunities and the explosive changes that new technology brings. They must also be continually responsive to cultural differences, quality concerns and ethical issues.

A career path in marketing typically begins in an entry-level position in advertising, retailing, marketing analytics, marketing consulting, or professional selling. Opportunities are available in manufacturing, wholesale and retail, as well as nonprofit organizations such as universities, government agencies, relief agencies and charitable organizations.

Success in marketing requires understanding a number of fundamental concepts, principles, theories, tools and techniques. Courses are designed to help students acquire this knowledge and to develop competencies needed throughout a marketing career.
Marketing Certifications
The Department of Marketing offers three certificate programs for BBA business and BS–Agribusiness majors. Each program is designed to complement the student’s degree by providing a concentrated course of study, participation in a designated student organization or competition, and an internship in the selected area.

Marketing Academic Advising
Academic advising and career guidance for upper division marketing majors is available in the Department of Marketing office, Suite 220 Wehner Building, (979) 845-2309.

Faculty
Berry, Leonard L, Distinguished Professor
Marketing
PhD, Arizona State University, 1968

Bridges, Cheryl H, Adjunct Professor
Marketing
BA, Texas Women’s University, 1968

Busch, Paul S, Systems Regent Professor
Marketing
PhD, Pennsylvania State University, 1974

Chen, Haipeng, Associate Professor
Marketing
PhD, University of Minnesota, 2002

Gresham, Larry G, Associate Professor
Marketing
PhD, University of South Carolina, 1982

Houston, Mark B, Professor
Marketing
PhD, Arizona State University, 1995

Jain, Sanjay, Professor
Marketing
PhD, University of Arizona, 1995

Janakiraman, Ramkumar, Associate Professor
Marketing
PhD, University of Southern California, 2006

Liu, Yan, Assistant Professor
Marketing
PhD, Purdue University, 2010

Loring, Andrew J, Lecturer
Marketing
MS, University of Maine, 2012

McDaniel, Stephen W, Professor
Marketing
PhD, University of Arkansas, 1979

Molhusen, Brian E, Executive Professor
Marketing
BBA, Texas A&M University, 1978

Parish, Janet T, Clinical Professor
Marketing
PhD, University of Alabama, 2002

Pride, William M, Professor
Marketing
PhD, Louisiana State University, 1972

Ramanathan, Suresh, Professor
Marketing
PhD, New York University, 2002

Seipp, Leslie S, Lecturer
Marketing
MBA, Rice University, 2008

Shankar, Venkatesh, Professor
Marketing
PhD, Northwestern University, 1995

Sorescu, Alina, Associate Professor
Marketing
PhD, University of Houston, 2002

Troy, Alesia C, Clinical Professor
Marketing
PhD, Texas A&M University, 1997

Varadarajan, Poondi, Distinguished Professor
Marketing
PhD, University of Massachusetts, 1979

Warren, Caleb T, Assistant Professor
Marketing
PhD, University of Colorado, 2010

Yadav, Manjit S, Professor
Marketing
PhD, Virginia Tech, 1990

Zimmer, Mary R, Clinical Associate Professor
Marketing
PhD, University of Texas, 1985

Majors
• Bachelor of Business Administration in Marketing (p. 231)
• Bachelor of Business Administration in Marketing, Advertising Strategy Track (p. 234)
• Bachelor of Business Administration in Marketing, Analytics and Consulting Track (p. 236)
• Bachelor of Business Administration in Marketing, Professional Selling and Sales Management Track (p. 232)
• Bachelor of Business Administration in Marketing, Retail Buying and Management Track (p. 235)

Certificates
• Advertising Strategy Certificate (p. 237)
• Analytics and Consulting Certificate (p. 238)
• Professional Selling and Sales Management Certificate (p. 239)
• Retail Buying and Management Certificate (p. 238)
Marketing - BBA

Upper-level Entry Requirements and Application Procedures

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1. To be admitted to an upper-level major, a student must be admitted to Mays Business School and must have:
   a. Satisfactorily completed the following five courses:
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      - ECON 202 Principles of Economics 3
      - ECON 203 Principles of Economics 3
      - MATH 141 Business Mathematics I (or its equivalent) 3
      - MATH 142 Business Mathematics II (or its equivalent) 3
   b. BUAD students apply for upper level no later than the last class day of the semester before they expect to enter upper level.
      To enter upper level in the summer, all requirements must be completed by the beginning of the first summer session.
   c. Unless satisfactorily completed prior to upper-level entry, business students must successfully complete these three remaining lower-level Common Body of Knowledge (CBK) courses at Texas A&M during their first upper-level semester:
      - ACCT 230 Introductory Accounting 3
      - ISYS 210 Fundamentals of Information Systems 3
      - MGMT 211 Legal and Social Environment of Business 3
   Students are encouraged to complete the freshman and sophomore sequence of courses as listed under Curriculum in Business. BUAD students may pre-register for upper-level business courses in the semester for which they have applied for upper level. However, BUAD students who fail to complete upper-level requirements prior to the start of the semester shall not be permitted to remain registered in upper-level business classes.

2. Transfer students: Transfer students admitted to Mays Business School will be classified as BUAD (lower-level Business) students until they complete all requirements listed previously in Item 1, at which time they may apply for admission to an upper-level major field of study. Transfer students may immediately apply for upper-level when admitted to Mays Business School if, and only if, they meet all upper-level requirements at that time.

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Program Requirements

Lower-Level Business Program

First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 141 Business Mathematics I $^1$</td>
<td>3</td>
</tr>
<tr>
<td>American history (p. 23) $^2$</td>
<td>3</td>
</tr>
<tr>
<td>Communication</td>
<td>3</td>
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</table>

Select one of the following:
- COMM 203 Public Speaking
- COMM 243 Argumentation and Debate
- ENGL 104 Composition and Rhetoric

Life and physical sciences (p. 20) 3
Social and behavioral sciences (p. 23) 3

Term Semester Credit Hours 15

Spring

| ECON 202 Principles of Economics | 3 |
| MATH 142 Business Mathematics II $^1$ | 3 |
| American history (p. 23) $^2$ | 3 |
| Language, philosophy and culture (p. 21) | 3 |
| Life and physical sciences (p. 20) | 3 |

Term Semester Credit Hours 15

Second Year

Fall

| ACCT 229 Introductory Accounting | 3 |
| ECON 203 Principles of Economics | 3 |
| ISYS 210 Fundamentals of Information Systems | 3 |
| POLS 206 American National Government $^2$ | 3 |
| Communication | 3 |

Select one of the following:
- COMM 203 Public Speaking
- COMM 243 Argumentation and Debate
- ENGL 104 Composition and Rhetoric

Term Semester Credit Hours 15

Spring

| ACCT 230 Introductory Accounting | 3 |
| MGMT 211 Legal and Social Environment of Business | 3 |
| POLS 207 State and Local Government $^2$ | 3 |
| Creative arts (p. 22) | 3 |

Term Semester Credit Hours 15
Life and physical sciences (p. 20) 3

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>15</td>
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</tbody>
</table>

Total Semester Credit Hours: 60

1  MATH 131, MATH 151 and MATH 171 will be accepted in lieu of MATH 142, MATH 152, MATH 166 and MATH 172 will be accepted in lieu of MATH 141.

2  For those students under ROTC contract, see Requirement 7 of the “Requirements for a Baccalaureate Degree” (p. 24).

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Business Honors: BUAD students admitted to Business Honors must add (1) BUSN 125 Business Learning Community I (3 credits) to the freshman year curriculum and (2) BUSN 205 Integrated Worklife Competencies (3 credits) to the sophomore year curriculum in Business (lower level). The creative arts elective and a communication elective can be taken during the junior year.

Upper-Level Marketing Program

Third Year

Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>FINC 341</td>
<td>Business Finance</td>
</tr>
<tr>
<td>MGMT 363</td>
<td>Managing People in Organizations</td>
</tr>
<tr>
<td>MKTG 321</td>
<td>Marketing</td>
</tr>
<tr>
<td>MKTG 404</td>
<td>Advanced Excel for Marketing Managers</td>
</tr>
<tr>
<td>SCMT 303</td>
<td>Statistical Methods</td>
</tr>
<tr>
<td>General elective 1</td>
<td>2</td>
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Term Semester Credit Hours: 15

Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>MKTG 322</td>
<td>Consumer Behavior</td>
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<tr>
<td>MKTG 323</td>
<td>Marketing Research 2</td>
</tr>
<tr>
<td>SCMT 364</td>
<td>Operations Management</td>
</tr>
<tr>
<td>Directed Elective 3</td>
<td>3</td>
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<tr>
<td>International elective 4</td>
<td>3</td>
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Term Semester Credit Hours: 15

Fourth Year

Fall

<table>
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<tbody>
<tr>
<td>Marketing elective (p. 886) 5</td>
<td>3</td>
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<tr>
<td>Directed or Marketing elective 3 or 5</td>
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</tr>
<tr>
<td>Directed elective 3</td>
<td>3</td>
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<tr>
<td>General elective 1</td>
<td>3</td>
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<tr>
<td>International elective 4</td>
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Term Semester Credit Hours: 15

Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>MGMT 466</td>
<td>Strategic Management</td>
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<td>MKTG 448</td>
<td>Marketing Strategy 2</td>
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</table>

Term Semester Credit Hours: 15

Marketing elective (p. 886) 5 3
Directed elective 3 3
General elective 1 3

Term Semester Credit Hours: 15

Total Semester Credit Hours: 60

1  Elective courses are open to any course offered for University credit, except ACCT 209, ACCT 210, FINC 409, IBUS 301, ISYS 209, KINE 198, MGMT 209, MGMT 309, MKTG 409, SCMT 309. Additional restrictions may apply: see academic advisor for information. May be taken on a satisfactory/unsatisfactory basis.

2  This course is an approved writing-designated (W) or oral communication (C) business course. See your academic advisor for additional information.

3  MKTG majors select a directed elective track and take courses as indicated from the chosen track.

4  Six hours required. A complete list of approved courses is available in the Undergraduate Program Office, 238 Wehner Building. The six hours of approved international elective courses simultaneously fulfills the University's International and Cultural Diversity Graduation requirement.

5  Any MKTG course (except required MKTG courses and MKTG 409) and IBUS 401-IBUS 403 (p. 832). A maximum of 6 hours of MKTG 402/IBUS 402, MKTG 403/IBUS 403, MKTG 484, MKTG 485, BUSN 392 may be used.

Marketing - BBA, Professional Selling and Sales Management Track

Students who are looking to expand their communication and relationship building skills should consider Professional Selling and Sales Management track. Students in this program will take four sales-related directed electives that provide real world scenarios and role-plays which help them build skills that are critical for a successful career in sales and marketing. Upon graduating in the sales track, students will have enhanced their interpersonal communication skills in a business environment which gives them a distinct advantage in the job market regardless of the planned career path.

Program Requirements

Lower-Level Business Program

First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 141</td>
<td>Business Mathematics 1 1</td>
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<tr>
<td>American history (p. 23) 2</td>
<td>3</td>
</tr>
<tr>
<td>Communication</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
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<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
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<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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<tr>
<td>Life and physical sciences (p. 20)</td>
<td>3</td>
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</table>
Social and behavioral sciences (p. 23) 3

**Term Semester Credit Hours** 15

**Spring**

ECON 202 Principles of Economics 3
MATH 142 Business Mathematics II 1 3
American history (p. 23) 2 3
Language, philosophy and culture (p. 21) 3
Life and physical sciences (p. 20) 3

**Second Year**

**Fall**

ACCT 229 Introductory Accounting 3
ECON 203 Principles of Economics 3
ISYS 210 Fundamentals of Information Systems 3
POLS 206 American National Government 2 3

**Spring**

ACCT 230 Introductory Accounting 3
MGMT 211 Legal and Social Environment of Business 3
POLS 207 State and Local Government 2 3
Creative arts (p. 22) 3
Life and physical sciences (p. 20) 3

**Total Semester Credit Hours:** 60

1 MATH 131, MATH 151 and MATH 171 will be accepted in lieu of MATH 142. MATH 152, MATH 166 and MATH 172 will be accepted in lieu of MATH 141.
2 For those students under ROTC contract, see Requirement 7 of the "Requirements for a Baccalaureate Degree" (p. 24).

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Business Honors: BUAD students admitted to Business Honors must add (1) BUSN 125 Business Learning Community I (3 credits) to the freshman year curriculum and (2) BUSN 205 Integrated Worklife Competencies (3 credits) to the sophomore year curriculum in Business (lower level). The creative arts elective and a communication elective can be taken during the junior year.

---

**Upper-Level Marketing Program**

**Third Year**

**Fall**

**Semester Credit Hours**

FINC 341 Business Finance 3
MGMT 363 Managing People in Organizations 3
MKTG 321 Marketing 3
MKTG 404 Advanced Excel for Marketing Managers 1
SCMT 303 Statistical Methods 3
General elective 1 2

**Term Semester Credit Hours** 15

**Spring**

MKTG 322 Consumer Behavior 3
MKTG 323 Marketing Research 2 3
SCMT 364 Operations Management 3
Directed Elective 3 3
International elective 4 3

**Fourth Year**

**Fall**

Marketing elective (p. 886) 5 3
Directed elective 3 3
Directed elective 3 3
General elective 1 3
International elective 4 3

**Spring**

MGMT 466 Strategic Management 3
MKTG 448 Marketing Strategy 2 3
Marketing elective (p. 886) 5 3
Directed elective 3 3
General elective 1 3

**Term Semester Credit Hours** 15

**Total Semester Credit Hours:** 60

1 Elective courses are open to any course offered for University credit, except ACCT 209, ACCT 210, FINC 409, IBUS 301, ISYS 209, KINE 198, MGMT 209, MGMT 309, MKTG 409, SCMT 309. Additional restrictions may apply: see academic advisor for information. May be taken on a satisfactory/unsatisfactory basis.
2 This course is an approved writing-designated (W) or oral communication (C) business course. See your academic advisor for additional information.
3 Twelve hours required. Select from MKTG 335, MKTG 347, MKTG 489, MKTG 435 and MKTG 436.
4 Six hours required. A complete list of approved courses is available in the Undergraduate Program Office, 238 Wehner Building. The six hours of approved international elective courses simultaneously fulfill the University's International and Cultural Diversity Graduation requirement.
5 Six hours required. Any MKTG course (except required MKTG courses and MKTG 409) and IBUS 401-IBUS 403 (p. 832). A maximum of 6 hours of MKTG 402/IBUS 402, MKTG 403/IBUS 403, MKTG 484, MKTG 485, BUSN 392 may be used.
Marketing - BBA, Advertising Strategy Track

The Department of Marketing offers students interested in advertising several opportunities for building skills specific to that career, and for networking with advertising professionals. In addition to taking advertising courses, students can attend professional conferences, participate in local, regional, and national advertising campaign competitions, and tour top advertising agencies.

The Advertising Strategy track supplements their degree by tailoring directed elective courses and building specific advertising skills. It also provides recruiters a means of identifying top students interested in advertising.

Students who complete the Advertising Strategy track are well-prepared for careers in advertising account services or brand management, or they may choose to specialize in related areas such as media planning, social and digital media, or public relations.

Program Requirements

Lower-Level Business Program

First Year

Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 141 - Business Mathematics I</td>
<td>3</td>
</tr>
<tr>
<td>American history (p. 23)</td>
<td>3</td>
</tr>
<tr>
<td>Communication</td>
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<tr>
<td>Select one of the following:</td>
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<tr>
<td>COMM 203 - Public Speaking</td>
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<td>COMM 243 - Argumentation and Debate</td>
<td></td>
</tr>
<tr>
<td>ENGL 104 - Composition and Rhetoric</td>
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</table>

Life and physical sciences (p. 20)
Social and behavioral sciences (p. 23)

| Term Semester Credit Hours | 15                     |

Spring

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
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<td>MATH 142 - Business Mathematics II</td>
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<tr>
<td>American history (p. 23)</td>
<td>3</td>
</tr>
<tr>
<td>Language, philosophy and culture (p. 21)</td>
<td></td>
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<tr>
<td>Life and physical sciences (p. 20)</td>
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</tr>
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</table>

| Term Semester Credit Hours | 15                     |

Second Year

Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
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<td>3</td>
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<tr>
<td>ECON 203 - Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>ISYS 210 - Fundamentals of Information Systems</td>
<td>3</td>
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<td>POLS 206 - American National Government</td>
<td>3</td>
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<td>Communication</td>
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<tr>
<td>COMM 243 - Argumentation and Debate</td>
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</table>

| Term Semester Credit Hours | 15                     |

Upper-Level Marketing Program

Third Year

Fall

<table>
<thead>
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<th>Course</th>
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<tbody>
<tr>
<td>FINC 341 - Business Finance</td>
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<tr>
<td>MGMT 363 - Managing People in Organizations</td>
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<tr>
<td>MKTG 321 - Marketing</td>
<td>3</td>
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<tr>
<td>MKTG 404 - Advanced Excel for Marketing Managers</td>
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<td>SCMT 303 - Statistical Methods</td>
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General elective 1

| Term Semester Credit Hours | 15                     |

Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>MKTG 322 - Consumer Behavior</td>
<td>3</td>
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<tr>
<td>MKTG 323 - Marketing Research 2</td>
<td>3</td>
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<tr>
<td>SCMT 364 - Operations Management</td>
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<tr>
<td>Directed elective 3</td>
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</table>

International elective 4

| Term Semester Credit Hours | 15                     |

Fourth Year

Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Marketing elective (p. 886)</td>
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<td>3</td>
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Directed elective 3
General elective 1
International elective 4

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<th>Term</th>
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<tbody>
<tr>
<td>Spring</td>
<td>15</td>
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<tr>
<td>MGMT 466</td>
<td>Strategic Management</td>
</tr>
<tr>
<td>MKTG 448</td>
<td>Marketing Strategy 2</td>
</tr>
<tr>
<td>Marketing elective (p. 886) 5</td>
<td>3</td>
</tr>
<tr>
<td>Directed elective 3</td>
<td>3</td>
</tr>
<tr>
<td>General elective 1</td>
<td>3</td>
</tr>
</tbody>
</table>

| Term Semester Credit Hours | 15 |

| Total Semester Credit Hours: | 60 |

1 Elective courses are open to any course offered for University credit, except ACCT 209, ACCT 210, FINC 409, IBUS 301, ISYS 209, KINE 198, MGMT 209, MGMT 309, MKTG 409, SCMT 309. Additional restrictions may apply: see academic advisor for information. May be taken on a satisfactory/unsatisfactory basis.

2 This course is an approved writing-designated (W) or oral communication (C) business course. See your academic advisor for additional information.

3 Twelve hours required. Select from MKTG 345, MKTG 347, MKTG 445, MKTG 447 and MKTG 442.

4 Six hours required. A complete list of approved courses is available in the Undergraduate Program Office, 238 Wehner Building. The six hours of approved international elective courses simultaneously fulfill the University’s International and Cultural Diversity Graduation requirement.

5 Six hours required. Any MKTG course (except required MKTG courses and MKTG 409) and IBUS 401-IBUS 403 (p. 832). A maximum of 6 hours of MKTG 402/IBUS 402, MKTG 403/IBUS 403, MKTG 484, MKTG 485, BUSN 392 may be used.

Marketing - BBA, Retail Buying and Management Track

The Center for Retailing Studies is a nationally known and respected center that is part of the Department of Marketing in Mays Business School at Texas A&M University. The Center is a bridge between the academic and business community, and serves students, faculty, and partner firms in a variety of ways, one of which is the Retail Buying and Management track of the BBA in Marketing.

The Retail Buying and Management track requires four retailing related directed electives. Graduates who complete this track are well equipped for exciting careers in management, merchandising, retail financial planning, and marketing. Completion of the program provides tangible evidence of commitment to and expertise in retailing.

Program Requirements

Lower-Level Business Program

First Year

Fall

<table>
<thead>
<tr>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 141 Business Mathematics 1 1</td>
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Spring

<table>
<thead>
<tr>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>American history (p. 23) 2</td>
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<tr>
<td>Communication 3</td>
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</table>

Select one of the following:

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<thead>
<tr>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>COMM 203 Public Speaking</td>
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<tr>
<td>COMM 243 Argumentation and Debate</td>
</tr>
<tr>
<td>ENGL 104 Composition and Rhetoric</td>
</tr>
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</table>

2 American history (p. 23)

Language, philosophy and culture (p. 21)

Life and physical sciences (p. 20)

Second Year

Fall

<table>
<thead>
<tr>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>ACCT 229 Introductory Accounting</td>
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<tr>
<td>ECON 203 Principles of Economics</td>
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<tr>
<td>ISYS 210 Fundamentals of Information Systems</td>
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<tr>
<td>POLS 206 American National Government 2</td>
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2 Communication 3

Select one of the following:

<table>
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Creative arts (p. 22)

Life and physical sciences (p. 20)

Spring

<table>
<thead>
<tr>
<th>Semester Credit Hours</th>
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<tbody>
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<td>ACCT 230 Introductory Accounting</td>
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<tr>
<td>MGMT 211 Legal and Social Environment of Business</td>
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<td>POLS 207 State and Local Government 2</td>
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2 Creative arts (p. 22)

Life and physical sciences (p. 20)

Management Information Systems: BUAD students intending to major in Management Information Systems must add ISYS 250 Business Programming Logic and Design (3 credits) to sophomore year curriculum in Business (lower level). The creative arts elective or a communication elective can be taken during the junior year.

Business Honors: BUAD students admitted to Business Honors must add (1) BUSN 125 Business Learning Community I (3 credits) to the freshman year curriculum and (2) BUSN 205 Integrated Worklife Competencies (3 credits) to the sophomore year curriculum in Business (lower level).
creative arts elective and a communication elective can be taken during the junior year.

**Upper-Level Marketing Program**

**Third Year**

**Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>FINC 341</td>
<td>Business Finance</td>
<td>3</td>
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<td>MGMT 363</td>
<td>Managing People in Organizations</td>
<td>3</td>
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<tr>
<td>MKTG 321</td>
<td>Marketing</td>
<td>3</td>
</tr>
<tr>
<td>MKTG 404</td>
<td>Advanced Excel for Marketing Managers</td>
<td>1</td>
</tr>
<tr>
<td>SCMT 303</td>
<td>Statistical Methods</td>
<td>3</td>
</tr>
<tr>
<td>General elective 1</td>
<td></td>
<td>2</td>
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**Spring**

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Credit Hours</th>
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<tbody>
<tr>
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<td>Consumer Behavior</td>
<td>3</td>
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<td>MKTG 323</td>
<td>Marketing Research</td>
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<tr>
<td>SCMT 364</td>
<td>Operations Management</td>
<td>3</td>
</tr>
<tr>
<td>Directed Elective 3</td>
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<tr>
<td>International elective 4</td>
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**Term Semester Credit Hours**: 15

**Fourth Year**

**Fall**

<table>
<thead>
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<th>Course Code</th>
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<tbody>
<tr>
<td>Marketing elective (p. 886) 5</td>
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<tr>
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<td>3</td>
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<tr>
<td>General elective 1</td>
<td></td>
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<td></td>
<td>3</td>
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**Spring**

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<tbody>
<tr>
<td>MGMT 466</td>
<td>Strategic Management</td>
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</tr>
<tr>
<td>MKTG 448</td>
<td>Marketing Strategy</td>
<td>3</td>
</tr>
<tr>
<td>Marketing elective (p. 886) 5</td>
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<td></td>
<td>3</td>
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<tr>
<td>General elective 1</td>
<td></td>
<td>3</td>
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**Term Semester Credit Hours**: 15

**Total Semester Credit Hours**: 60

---

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2. This course is an approved writing-designated (W) or oral communication (C) business course. See your academic advisor for additional information.

3. Twelve hours required. Select from MKTG 325, MKTG 326, MKTG 425, MKTG 426 and MKTG 438.

4. Six hours required. A complete list of approved courses is available in the Undergraduate Program Office, 238 Wehner Building. The six hours of approved international elective courses simultaneously fulfill the University's International and Cultural Diversity Graduation requirement.

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**Marketing - BBA, Analytics and Consulting Track**

The Analytics and Consulting track complements the student's degree and provides tangible evidence of rigorous academic and experiential preparation for a career in analytics or consulting. The curriculum emphasizes Marketing Analytics and Marketing Consulting as well as a consulting project in corporate social responsibility.

Students who complete this track can work in marketing analytics or consulting positions for Marketing, Information Systems, or Organizational Structure.

**Program Requirements**

**Lower-Level Business Program**

**First Year**

**Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
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<td>Communication</td>
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<td>3</td>
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<tr>
<td>Select one of the following:</td>
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<td>COMM 203</td>
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<td>COMM 243</td>
<td>Argumentation and Debate</td>
<td>3</td>
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<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
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<tr>
<td>Life and physical sciences (p. 20) 3</td>
<td></td>
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</tr>
<tr>
<td>Social and behavioral sciences (p. 23) 3</td>
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**Spring**

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**Second Year**

**Fall**

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<tr>
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<td>POLS 206</td>
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<td>3</td>
</tr>
<tr>
<td>Communication</td>
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<td>3</td>
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</table>
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- COMM 203 Public Speaking
- COMM 243 Argumentation and Debate
- ENGL 104 Composition and Rhetoric

**Term Semester Credit Hours** 15

**Spring**

- ACCT 230 Introductory Accounting 3
- MGMT 211 Legal and Social Environment of Business 3
- POLS 207 State and Local Government 2
- Creative arts (p. 22) 3
- Life and physical sciences (p. 20) 3

**Term Semester Credit Hours** 15

Total Semester Credit Hours: 60

1 MATH 131, MATH 151 and MATH 171 will be accepted in lieu of MATH 142. MATH 152, MATH 166 and MATH 172 will be accepted in lieu of MATH 141.

For those students under ROTC contract, see Requirement 7 of the "Requirements for a Baccalaureate Degree" (p. 24).

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### Upper-Level Marketing Program

#### Third Year

**Fall**

- FINC 341 Business Finance 3
- MGMT 363 Managing People in Organizations 3
- MKTG 432 Marketing 3
- MKTG 430 Advanced Excel for Marketing Managers 1
- SCMT 303 Statistical Methods 3
- General elective 1

**Term Semester Credit Hours** 15

**Spring**

- MKTG 322 Consumer Behavior 3
- MKTG 323 Marketing Research 2
- MKTG 430 Marketing Consulting 3
- SCMT 364 Operations Management 3
- International elective 4

**Term Semester Credit Hours** 15

**Fourth Year**

**Fall**

- MKTG 431 Marketing Analytics 3
- Marketing elective (p. 886) 5
- Marketing elective (p. 886) 5
- General elective 1
- International elective 4

**Term Semester Credit Hours** 15

Total Semester Credit Hours: 60

1 General electives are any courses offered for University credit, except ACCT 209, ACCT 210, FINC 409, IBUS 301, ISYS 209, KINE 198, MGMT 209, MGMT 309, MKTG 409, SCMT 309. Additional restrictions may apply; see academic advisor for information. May be taken on a satisfactory/unsatisfactory basis.

2 This course is an approved writing-designated (W) or oral communication (C) business course. See your academic advisor for additional information.

3 Directed elective. Required courses MKTG 430, MKTG 431, and MKTG 432.

4 Six hours required. A complete list of approved courses is available in the Undergraduate Program Office, 238 Wehner Building. The six hours of approved international elective courses simultaneously fulfill the University’s International and Cultural Diversity Graduation requirement.

5 Nine hours required. Any MKTG course (except required MKTG courses and MKTG 409) and IBUS 401-IBUS 403 (p. 832). A maximum of 6 hours of MKTG 402/IBUS 402, MKTG 403/IBUS 403, MKTG 484, MKTG 485, BUSN 392 may be used.

### Advertising Strategy - Certificate

The Department of Marketing offer students interested in advertising several opportunities for building skills specific to that career, and for networking with advertising professionals. In addition to taking advertising courses students can attend professional conferences, participate in local, regional, and national advertising campaign competitions, and tour top advertising agencies.

Of particular interest to students is the Certificate in Advertising, which supplements their degree by providing an opportunity to tailor elective course offerings and build specific advertising skills. It also provides recruiters a means of identifying top students interested in advertising. Students who earn the Certificate in Advertising are well-prepared for careers in advertising account services or brand management, or they may choose to specialize in related areas such as media planning, social and digital media, or public relations.

Open to all business majors, the Certificate in Advertising requires three approved advertising related classes, an internship, and active participation in the Aggie Advertising Club. For more information, contact...
Dr. Lisa Troy at ltroy@mays.tamu.edu or Hannah Cole, marketing academic advisor, at hcole@mays.tamu.edu.

Program Requirements

Requirements include 12 hours of specific coursework, completion of an internship, and 2 semesters in the Aggie Advertising Club.

Required Courses 12

Select four of the following:

- MKTG 345 Social Media and Public Relations
- MKTG 347 Advertising and Creative Marketing Communications
- MKTG 442 Innovation and Product Management
- MKTG 445 Account Planning and Research
- MKTG 447 Advanced Advertising: Case Competition

An internship in the advertising industry is required. The internship must be for a minimum of 300 hours over 15 weeks or fewer. Academic credit is not required for the internship. However, no more than 20% of work can be clerical or unrelated to the development of professional skills in marketing. The internship must offer meaningful, professional-level learning in areas of sales, advertising, retailing, sports marketing, event planning, or communication. The internship student must comply with all company regulations, health and safety conditions, and legal requirements.

Internship objectives:

- Apply academic knowledge in a supervised work environment
- Build contacts
- Develop professional competencies
- Increase understanding of marketing career paths

Active participation in the associated student organization, Aggie Advertising Club, is required. Participation points are earned through various programs and are verified by the organization advisor. Financial aid is available by application through the Department of Marketing.

Students must complete the 12 hours of specific coursework and earn a grade of 'B' or better in each certificate course, as well as have a minimum cumulative GPA of 3.0 by graduation.

Analytics and Consulting - Certificate

The Certificate in Analytics and Consulting complements the student’s degree and provides tangible evidence of rigorous academic and experiential preparation for a career in analytics or consulting. Students who earn this certificate can work in Marketing Analytics or Consulting positions for Marketing, Information Systems, or Organizational Structure.

The curriculum emphasizes Marketing Analytics and Marketing Consulting as well as a consulting project in Corporate Social Responsibility. The required internship teaches lessons the classroom cannot.

Through the American Marketing Association students refine professional skills including networking, leadership, and career preparation. The certificate is open to all BBA business majors and requires 12 hours of coursework, an internship, and active participation in the American Marketing Association’s student organization at Texas A&M. For more information, contact Hannah Cole, marketing academic advisor, at hcole@mays.tamu.edu.

Program Requirements

Requirements include 12 hours of specific coursework, completion of an internship, and 2 semesters in the American Marketing Association.

Required Courses 9

- MKTG 430 Marketing Consulting
- MKTG 431 Marketing Analytics
- MKTG 432 Corporate Social Responsibility

Select one of the following: 3

- MKTG 325 Retailing Concepts and Policies
- MKTG 326 Strategic Retailing
- MKTG 335 Professional Selling
- MKTG 345 Social Media and Public Relations
- MKTG 347 Advertising and Creative Marketing Communications
- MKTG 425 Retail Merchandising
- MKTG 426 Advanced Retail Case Study
- MKTG 435 Advanced Selling
- MKTG 436 Sales Management
- MKTG 438 Strategic Digital Marketing
- MKTG 442 Innovation and Product Management
- MKTG 445 Account Planning and Research
- MKTG 447 Advanced Advertising: Case Competition
- MKTG 489 Special Topics in...

Total Semester Credit Hours 12

An internship in the sales industry is required. The internship must be for a minimum of 300 hours over 15 weeks or fewer. Academic credit is not required for the internship. However, no more than 20% of work can be clerical or unrelated to the development of professional skills in marketing. The internship must offer meaningful, professional-level learning in areas of sales, advertising, retailing, sports marketing, event planning, or communication. The internship student must comply with all company regulations, health and safety conditions, and legal requirements.

Internship objectives:

- Apply academic knowledge in a supervised work environment
- Build contacts
- Develop professional competencies
- Increase understanding of career paths in marketing

Participation in the associated student competition, Texas A&M Collegiate Sales Competition, is required.

Students must complete 12 hours of specific coursework, earn a grade of 'B' or better in each certificate course, and have a minimum cumulative GPA of 3.0 by graduation.

Retail Buying and Management - Certificate

The Center for Retailing Studies is a nationally known and respected center that is part of the Department of Marketing in Mays Business School at Texas A&M University. The Center, a bridge between the...
academic and business community, serves students, faculty, and partner firms in a variety of ways. Of particular interest to our students is the Certificate in Retailing, which requires four retailing related classes, an internship, and participation in the Student Retailing Association.

Graduates who earn the Certificate in Retailing are well equipped for exciting careers in management, merchandising, retail financial planning, and marketing. Most Center partner companies hire students who have earned the certificate into executive development training programs which prepare them for the next level of career advancement.

The Certificate in Retailing is university-recognized, a supplement to a student's degree, and is open to all BBA business majors. Through a customized program of retailing, marketing, and related courses, and other educational experiences, students receive focused preparation for a retailing career. Completion of the program provides tangible evidence of commitment and expertise in retailing.

For more information contact Hannah Cole, marketing academic advisor, at hcole@mays.tamu.edu, or the Center for Retailing Studies staff in Suite 201 of the Wehner building.

Program Requirements

Requirements include 12 hours of specific coursework, completion of an internship, and 2 semesters in the Student Retailing Association.

Select four of the following: 12

<table>
<thead>
<tr>
<th>MKTG 325</th>
<th>Retailing Concepts and Policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>MKTG 326</td>
<td>Strategic Retailing</td>
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<tr>
<td>MKTG 425</td>
<td>Retail Merchandising</td>
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<tr>
<td>MKTG 426</td>
<td>Advanced Retail Case Study</td>
</tr>
<tr>
<td>MKTG 438</td>
<td>Strategic Digital Marketing</td>
</tr>
</tbody>
</table>

An internship in the retailing industry is required. The internship must be for a minimum of 300 hours over 15 weeks or fewer. Academic credit is not required for the internship. However, no more than 20% of work can be clerical or unrelated to the development of professional skills in marketing. The internship must offer meaningful, professional-level learning in areas of sales, advertising, retailing, sports marketing, event planning, or communication. The internship student must comply with all company regulations, health and safety conditions, and legal requirements.

Internship objectives:

- Apply academic knowledge in a supervised work environment
- Build contacts
- Develop professional competencies
- Increase understanding of career paths in marketing

Active participation in the associated student organization, Student Retailing Association, is required. Participation points are earned through various programs and are verified by the organization advisor. Financial aid is available by application through the Department of Marketing.

Students must complete 12 hours of required coursework, earn a grade of 'B' or better in each certificate course, and have a minimum cumulative GPA of 3.0 by graduation.
University Studies Programs

Mays Business School offers a degree in University Studies with a concentration in business. A University Studies degree differs from a traditional major in that it consists of a concentration and two minors of 15-18 hours each. The University Studies degree format was created to provide students the flexibility to combine areas of study that are of special interest.

Majors

• Bachelor of Science in University Studies, Business Concentration (p. 240)

University Studies - BS, Business Concentration

The Bachelor of Science is offered in University Studies by Texas A&M University. The University Studies-Business degree consists of a 24 hour business concentration and two minors of 15-18 hours each. The degree program allows a student to tailor his or her undergraduate work to align with future personal and career objectives.

The business concentration encompasses a foundational knowledge in the basic aspects of business including accounting, finance, management, management information systems, marketing and supply chain management.

Careers pursued by University Studies-Business graduates include financial advisor, account manager, marketing coordinator, sales representative, web developer, public relations specialist, consultant, and human resource specialist.

Specific requirements, course offerings, and restrictions exist for the University Studies-Business degree.

Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ACCT 209</td>
<td>Survey of Accounting Principles</td>
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<tr>
<td>FINC 409</td>
<td>Survey of Finance Principles</td>
<td>3</td>
</tr>
<tr>
<td>ISYS 209</td>
<td>Business Information Systems Concepts</td>
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<tr>
<td>MGMT 105</td>
<td>Introduction to Business</td>
<td>3</td>
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<tr>
<td>MGMT 209</td>
<td>Business, Government and Society</td>
<td>3</td>
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<tr>
<td>MGMT 309</td>
<td>Survey of Management</td>
<td>3</td>
</tr>
<tr>
<td>MKTG 409</td>
<td>Principles of Marketing</td>
<td>3</td>
</tr>
<tr>
<td>SCMT 309</td>
<td>Supply Chain Management Principles</td>
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University and College Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ENGL 103</td>
<td>Introduction to Rhetoric and Composition</td>
<td>3</td>
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<tr>
<td>or ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
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<tr>
<td>Select one of the following:</td>
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<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
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<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
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<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
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<tr>
<td>COMM 205</td>
<td>Communication for Technical Professions</td>
<td></td>
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<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
<td></td>
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<tr>
<td>THAR 407</td>
<td>Performing Literature</td>
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</tbody>
</table>

Creative arts (p. 22) 3  
Social and behavioral sciences (p. 23) 3  
American history (p. 23) 6  
POLS 206  American National Government 3  
POLS 207  State and Local Government 3  
Minor choice one 1 15-18  
Minor choice two 1 15-18  
Electives 2 18-24  

Total Semester Credit Hours 120

1 The student is encouraged to identify minors that complement the business concentration and reflect the student’s individual interests and strengths. The two minors must be completed outside of Mays Business School.

2 Enrollment of University Studies majors in courses offered at Mays Business School is limited to the required business concentration courses plus the following courses to be used as electives: ACCT 210, BUSN 302, BUSN 403, FINC 201 and MGMT 212.
Texas A&M Baylor College of Dentistry

Administrative Officers
Dean - Lawrence E. Wolinsky, Ph.D., D.M.D.
Associate Dean, Academic Affairs - Charles W. Berry, Ph.D.
Associate Dean, Research and Graduate Studies - Larry L. Bellinger, Ph.D.
Executive Director, Facilities Services and Planning - Dale A. Christensen, M.B.A.
Associate Dean, Student Affairs - Jack L. Long, D.D.S.
Associate Dean, Clinical Affairs - Dean A. Hudson, D.D.S.
Executive Director, Communications, Institutional Advancement and Alumni Affairs - Susan Mitchell Jackson, M.A.
Associate Dean, Finance and Administration - Juanna S. Moore, C.P.A.
Executive Director, Institutional Research - Eric S. Solomon, D.D.S.

General Statement
The Baylor College of Dentistry has been a distinguished resource for dental education in Texas for more than 100 years and is dedicated to combining higher education and research with community service.

Known internationally for producing excellent clinicians, the college opened in 1905. Since then, it has graduated more than 8,000 dentists and dental hygienists. Nearly one-third of all dentists in Texas are Baylor College of Dentistry graduates. The college also graduates a large number of dental hygienists with bachelor's degrees in the state. In addition to a doctor of dental surgery and bachelor's degree in dental hygiene, postdoctoral certificate and degree programs are offered.

Today, the college works toward innovative treatments, leading-edge technology and better ways to deliver care. It not only ensures that Texas has qualified generations of dentists, dental hygienists and scientists, but also provides care for patients who have no other access to oral health care.

Location
The Baylor College of Dentistry is located in Dallas, Texas, adjacent to the rapidly expanding Baylor University Medical Center. The Dallas-Fort Worth metroplex is an area noted for the vigor, optimism and friendliness of its population. The ever-changing skyline reflects the continuing growth of the area.

Opportunities for educational, cultural and religious enrichment are numerous. Within a 100-mile radius of Dallas are more than 40 colleges and universities. Dallas has professional theater, opera, symphony and dance companies. Among the many museums and galleries in the area, the Dallas Museum of Art has received international acclaim for both its design and its exhibits.

For sports enthusiasts, Dallas has professional and college football, basketball, baseball, hockey and soccer teams. The metroplex annually hosts competitions in golf, tennis, bowling, soccer and running that attract many of the world's best athletes. Numerous lakes and parks provide recreational opportunities for boating, fishing, swimming, jogging, biking and horseback riding.

Dallas is served by a variety of transportation modes, including several interstate highways, the Amtrak rail system and the Dallas Area Rapid Transit system. The Dallas/Fort Worth International Airport, with many major and feeder airline connections, is one of the busiest air terminals in the nation. Airline connections also can be made at nearby Love Field, which is a 20-minute car ride from the college.

The Baylor College of Dentistry is centrally located in the city of Dallas, about one mile east of the downtown business district. This is an area where restored historic homes and varied types of new construction create diverse neighborhoods. The Texas State Fairgrounds and the downtown arts district, with its world-class performance halls and art museum, help make this part of Dallas an exciting place to live and work. Living accommodations are located as close as one block from the campus.

Office of Recruitment and Admissions
Baylor College of Dentistry
3302 Gaston Ave.
Dallas, TX 75246
(214) 828-8231
bcd.tamhsc.edu (http://bcd.tamhsc.edu)

Majors
Caruth School of Dental Hygiene
• Bachelor of Science in Dental Hygiene (p. 242)

Masters
Texas A&M Baylor College of Dentistry
• Master of Science in Oral Biology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/dentistry/interdepartmental/oral-biology-ms)

Department of Biomedical Sciences
• Master of Science in Biomedical Sciences (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/dentistry/biomedical-sciences/ms)

Caruth School of Dental Hygiene
• Master of Science in Dental Hygiene (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/dentistry/dental-hygiene/ms)

Doctoral
Texas A&M Baylor College of Dentistry
• Doctor of Philosophy in Oral Biology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/dentistry/interdepartmental/oral-biology-phd)

Department of Biomedical Sciences
• Doctor of Philosophy in Biomedical Sciences (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/dentistry/biomedical-sciences/phd)
Professional
Texas A&M Baylor College of Dentistry

• Doctor of Dental Surgery in Dentistry (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/dentistry/interdepartmental/dds)

Caruth School of Dental Hygiene

The Caruth School of Dental Hygiene is an integral part of the Baylor College of Dentistry. The dental hygiene school was equipped in 1954 through a generous gift from the Caruth Foundation of Dallas and W.W. Caruth, Jr., in honor of W.W. Caruth, Sr., a pioneer Texas philanthropist.

The first dental hygiene students were accepted in fall 1955. At that time, there was no requirement for previous college experience. In 1964, the Caruth School of Dental Hygiene established prerequisite courses prior to professional study. During the same year, the Bachelor of Science degree was offered in addition to the traditional certificate program. All graduates since 1973 have received the degree of Bachelor of Science in Dental Hygiene. In 1997, the Master of Science degree was added.

Purpose

The purpose of the Caruth School of Dental Hygiene is to educate preventive oral health professionals, eligible for licensure as dental hygienists, who are capable of providing educational, clinical and therapeutic services that support total health through the promotion of optimal oral health.

Opportunities

The services of a dental hygienist are offered in private dental practices and clinics, public health agencies, school systems, hospitals, nursing homes and corporate health facilities. Dental hygienists also teach in dental and dental hygiene programs and participate in health research. The baccalaureate degree offered through the Caruth School of Dental Hygiene by Baylor College of Dentistry satisfies the educational requirement for eligibility for state licensure. Graduates are provided with diverse experiences to prepare for a variety of employment settings and to pursue graduate education. A Master of Science in Education for Healthcare Professionals with a focus in dental hygiene is also offered.

Faculty

Dewald, Janice P, Professor
Dental Hygiene
DDS, University of Iowa, 1980

Kading, Cherri L, Assistant Professor
Dental Hygiene
MS, University of North Carolina at Chapel Hill, 2009

Mallonee, Lisa F, Associate Professor
Dental Hygiene
MPH, University of North Carolina at Chapel Hill, 2000

Muzzin, Kathleen B, Professor
Dental Hygiene
MS, University of Missouri, 1985

Wyatt, Leigh A, Assistant Professor
Dental Hygiene
MA, Dallas Theological Seminary, 2009

Majors

• Bachelor of Science in Dental Hygiene (p. 242)

Dental Hygiene - BS

Length: 2 years
General Admissions Requirements: 60 semester hours college coursework including core courses for BS degree
Application Deadline: January 5 of the year of anticipated entrance into the program.
Start Term: Fall
Specialization, Program of Study: Dental Hygiene
Degree: BS

Program Requirements

Coursework totaling 60 semester credit hours, including core courses for BS degree.

Third Year

Fall
DDHS 3110 Introduction To Dentistry 1
DDHS 3120 Dental Anatomy 2
DDHS 3160 Preclinical Dental Hygiene 6
DDHS 3220 Oral Radiology 5
DDHS 3250 Biomedical Sciences I 5
DDHS 3425 Health Promotion and Disease Prevention 2.5

Term Semester Credit Hours 16.5

Spring
DDHS 3020 Theory of Dental Hygiene Practice I 2
DDHS 3220 Oral Radiology 2
DDHS 3340 Biomedical Sciences II 4
DDHS 3310 Health Education and Behavioral Science 1
DDHS 3410 Introduction to Pathology 1
DDHS 3325 Microbiology 2.5
DDHS 3530 Applied Dental Materials 3
DDHS 3830 Clinical Dental Hygiene I 3

Term Semester Credit Hours 18.5

Summer
DDHS 4110 Medical Emergencies 1
DDHS 4220 Comprehensive Care Seminar 1 2
DDHS 4310 Oral Radiography 1
DDHS 4510 Pediatric Dentistry 1
DDHS 4820 Clinical Dental Hygiene II 2

Term Semester Credit Hours 7

Fourth Year

Fall
DDHS 4015 Pharmacology 1.5
DDHS 4025 Oral Pathology 2.5
DDHS 4110 Medical Emergencies 1
<table>
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<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>DDHS 4140</td>
<td>Clinical Dental Hygiene III</td>
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<tr>
<td>DDHS 4210</td>
<td>Professional Ethics</td>
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<td>DDHS 4220</td>
<td>Comprehensive Care Seminar</td>
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<tr>
<td>DDHS 4310</td>
<td>Oral Radiography (continued)</td>
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<tr>
<td>DDHS 4410</td>
<td>Gerontology</td>
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<tr>
<td>DDHS 4530</td>
<td>Public and Community Health</td>
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<td>DDHS 4610</td>
<td>Periodontics</td>
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<tr>
<td>DDHS 4620</td>
<td>Theory of Dental Hygiene Practice II</td>
<td>2</td>
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<tr>
<td>DDHS 4715</td>
<td>Research Methods</td>
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**Term Semester Credit Hours:** 14.5

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<td>DDHS 4010</td>
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<td>DDHS 4220</td>
<td>Comprehensive Care Seminar</td>
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<tr>
<td>DDHS 4240</td>
<td>Clinical Dental Hygiene IV</td>
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<td>DDHS 4310</td>
<td>Oral Radiography (continued)</td>
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<tr>
<td>DDHS 4320</td>
<td>Perspectives in Dental Hygiene</td>
<td>2</td>
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<tr>
<td>DDHS 4530</td>
<td>Public and Community Health</td>
<td>3</td>
</tr>
<tr>
<td>DDHS 4710</td>
<td>Applied Research Methods</td>
<td>1</td>
</tr>
<tr>
<td>DDHS 4810</td>
<td>Local Anesthesia and Nitrous Oxide/Oxygen Sedation</td>
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</tbody>
</table>

**Term Semester Credit Hours:** 12

**Total Semester Credit Hours:** 68.5

1 Scheduled by course director
College of Education and Human Development

Administrative Officers

Dean - Joyce M. Alexander, Ph.D.

Executive Associate Dean for Faculty Affairs - Mary Alfred, Ph.D.

Associate Dean for Academic Affairs and Research - George B. Cunningham, Ph.D.

Assistant Dean for Finance and Administration - Becky Carr, Ph.D.

Assistant Dean for Undergraduate Academic Affairs - R. Christopher Cherry, Ph.D.

Assistant Dean for Organizational Development and Diversity Initiatives - Nancy T. Watson, Ph.D.

General Statement

Within Texas A&M University, the College of Education and Human Development plays a proactive role in shaping the state and national educational agenda. To this end, programs in the College of Education and Human Development attempt to:

1. develop thinking professionals whose research adds to the store of knowledge regarding teaching and learning,
2. produce exemplary teachers and administrators to serve in school systems of the state and nation, and
3. assist Texas and the nation in using up-to-date knowledge to improve educational practice in diverse settings.

In summary, the College of Education and Human Development has three key functions: research, teaching and service.

Production of knowledge is central to the College of Education and Human Development’s research role. The College of Education and Human Development supports both basic and applied research activities. Of particular interest is the effort to translate research findings into models and prescriptions that will result in substantive educational and health improvement in field settings.

In discharging its teaching function, the College of Education and Human Development seeks to prepare highly qualified professionals for a wide variety of professional settings. Teacher preparation programs are particularly committed to providing students with the ability to use sophisticated technologies in their instructional repertoires.

Service to the state and nation through teaching, supervising and assisting schools, state agencies, other institutions of higher education, and businesses and industries is a strong commitment of the College of Education and Human Development. Increasingly, these service efforts build on new knowledge generated through the College of Education and Human Development’s research activities.

The College of Education and Human Development is responsible for managing programs for the preparation of certified school personnel. Other programs in the college prepare students for specific human service roles in the private sector and within state and community agencies. College of Education and Human Development majors include interdisciplinary studies (certification) EC-6, middle school, bilingual and special education; technology management and human resource development; health (including school health education); community health; kinesiology (including physical education certification); and sport management. Students seeking middle school certification also have a choice of majoring in English (offered through the College of Liberal Arts). Students interested in any elementary, middle school or secondary certification programs are responsible for meeting with an advisor in the Department of Teaching, Learning and Culture’s Office of Undergraduate Advising. Advisors have available specific information regarding all program options.

Students seeking secondary certification in areas other than health or kinesiology must major in an academic discipline offered through the appropriate college. Professional education courses for secondary certification are offered by the College of Education and Human Development. Students interested in secondary certification must report to an advisor in the Department of Teaching, Learning and Culture’s Office of Undergraduate Advising to access additional information about the multiple routes to secondary certification at the post-baccalaureate level.

Teaching fields, specialization areas and endorsements/delivery systems may be chosen from the following:

- Agricultural Science
- Bilingual (EC-6)
- Chemistry
- Computer Science
- Early Childhood
- English Language Arts and Reading
- English as a Second Language
- Health (EC-12)
- History
- Kinesiology (EC-12)
- Languages other than English (Spanish, French, German, Latin, Chinese)
- Life Science
- Mathematics
- Middle School English/Language Arts and Reading
- Middle School Science/Mathematics
- Middle School Social Studies/English
- Language Arts and Reading
- Physical Science
- Science
- Social Studies
- Special Education
- Speech

The College of Education and Human Development carries out its mission of research, teaching and service through the following departments: Educational Administration and Human Resource Development, Educational Psychology, Health and Kinesiology, and Teaching, Learning and Culture. Other contributing entities include Agricultural Education, the Center for Mathematics, Science and Technology Education, and the Counseling and Assessment Clinic. Detailed descriptions of College of Education and Human Development departments are provided on the following pages. The College of Education and Human Development is required by Federal policy to make available the summary report of students’ scores on the TExES examination. This information is available...
from the Associate Dean for Academic Affairs in the College of Education and Human Development.

**General Requirements for Admission to Professional Programs**

The programs of study in the College of Education and Human Development are composed of two phases—the pre-professional phase and the professional phase. The pre-professional phase consists of basic University Core Curriculum requirements and introductory courses to the major field of study. The professional phase consists of advanced work in the major field of study, courses in the professional underlying disciplines and professional studies courses.

Upon entering the College of Education and Human Development, students are assigned a general College of Education and Human Development major that tracks the pre-professional phase of their chosen program. To advance to the professional phase of the chosen program and to be accepted into the professional major, students must meet the program entry requirements and be accepted by the program faculty. Students are responsible for contacting the departmental advisors to obtain information about specific requirements for their major and program areas.

**Requirements for Admission to the Professional Phase of Teacher Education Programs**

The State of Texas establishes standards for teacher education programs. All certification programs at Texas A&M are in compliance with these requirements. Students must meet state, University, College of Education and Human Development and department/program requirements for matriculation into a teacher education program. Students are responsible for contacting the departmental advisors to obtain information about specific requirements for their major and program areas.

**Teacher Education Retention Policy**

A student, after being admitted to teacher education, who fails to continue to meet all requirements, will be dropped from the program and may not continue in or register for any professional teacher education course. Any student removed from or who discontinues student teaching because of unsatisfactory performance will be dropped from the teacher education program. A student dropped from the teacher education program may apply through their respective department for readmission to the teacher education program.

**Requirements for Admission to Student Teaching**

Students are responsible for contacting the departmental advisors to obtain information about specific requirements for their major and program areas.

**NOTE:** As several of the College of Education and Human Development’s teacher education programs are undergoing change and are pending approval, the programs offered, admission to professional programs, admission to professional phase of teacher education, retention policy, and requirements for admission to student teaching are subject to change. Students should check with advisors in the appropriate departments to receive the most current policies and procedures.

**Requirements for Admission to the Professional Phase of Non-Certification Programs**

The following requirements must be met by students seeking admission to the professional phase of non-certification programs.

1. An approved degree plan and application for admission to the professional phase of non-certification programs.
2. Minimum GPR as stated in program requirements available from departmental advisor.
3. Satisfy the English proficiency requirement as stated in program requirements available from departmental advisor.
4. Pass the THEA, ACCUPLACER, ASSET or COMPASS test or show proof of exemption from the test with appropriate STAAR, SAT or ACT scores.
5. Have sophomore or junior classification with a minimum of 15 semester credit hours at Texas A&M, and completion of University Core Curriculum requirements applicable to the respective degree program.
6. Admission to professional phase of some programs may be competitive. See departmental advisor.
7. Students must meet departmental criteria before acceptance into an approved internship. See departmental advisor.

**International and Cultural Diversity Requirement**

Texas A&M University requires its students to meet an International and Cultural Diversity requirement as part of the Graduation requirements. Meeting this requirement will require the careful selection of courses. The student is directed to the Requirements for a Baccalaureate Degree (p. 24) section of this catalog for detailed information regarding this requirement and also is encouraged to seek the advice of the student's academic advisor.

**Curriculum in Agricultural Science**

(Teaching Option)

The Agricultural Science curriculum is designed to offer the student a combination of courses in scientific agriculture and in professional education that will meet requirements for employment and advanced study in different careers in which the emphasis is on formal and informal programs of education. Such careers may include teaching agricultural science in high schools, area career and technology schools and community colleges; working as an agricultural extension agent; working as an agricultural representative for a marketing agency, an agricultural supply company or other industries related to agriculture; and serving as an agricultural development specialist in an international program.

A student majoring in agricultural science will be counseled by an advisor in the Department of Agricultural Leadership, Education, and Communications to ensure that the program developed with the student will satisfy his or her unique interests, needs and professional aspirations. A combination of courses in scientific agriculture, education and general studies provides students with a knowledge of scientific agriculture and the ability to work with and influence people. Flexibility in course selection allows a student to place emphasis on a particular field of agriculture or to prepare broadly in agricultural studies. This flexibility might prepare
a student to teach in a particular school setting, focusing upon a certain
curriculum (e.g., horticulture, animal science and agricultural business).

Many aspects of the practice of agriculture are learned through
experience. Enrollment in high school agricultural science and participation
in FFA and/or 4-H are encouraged and recommended.

A student following this curriculum may be eligible to enter public schools
as a teacher of agricultural science under the Texas Education Agency.
Off-campus student teaching is required.

For further information, see the section on Agricultural Science under the
College of Agriculture and Life Sciences. The Department of Agricultural
Leadership, Education, and Communications administers the program in
Agricultural Science.

**Majors**

**Department of Educational Administration
and Human Resource Development**
- Bachelor of Science in Human Resource Development (p. 249)
- Bachelor of Science in Technology Management (p. 250)

**Department of Educational Psychology**
- Bachelor of Science in Interdisciplinary Studies, Bilingual Education-EC6 (p. 253)
- Bachelor of Science in Interdisciplinary Studies, Special Education-EC12 (p. 255)
- Bachelor of Science in University Studies, Child Professional Services
  Concentration (p. 256)

**Department of Health and Kinesiology**

**Health**
- Bachelor of Science in Community Health (p. 264)
- Bachelor of Science in Health, Allied Health Track (p. 265)
- Bachelor of Science in Health, School Health Track (p. 266)

**Kinesiology**
- Bachelor of Science in Kinesiology, All-Level Physical Education
  Teacher Certification Track (p. 268)
- Bachelor of Science in Kinesiology, Dance Science Track (p. 269)
- Bachelor of Science in Kinesiology, Exercise Science Track, Applied
  Exercise Physiology Concentration (p. 270)
- Bachelor of Science in Kinesiology, Exercise Science Track, Basic
  Exercise Physiology Concentration (p. 271)
- Bachelor of Science in Kinesiology, Exercise Science Track, Motor
  Behavior Concentration (p. 272)
- Bachelor of Science in University Studies, Sports Conditioning
  Concentration (p. 277)
- Bachelor of Science in University Studies, Dance Concentration
  (p. 276)

**Sports Management**
- Bachelor of Science in Sport Management, Internship Track (p. 274)
- Bachelor of Science in Sport Management, Non-Internship Track
  (p. 275)
- Bachelor of Science in University Studies, Sports Leadership
  Concentration (p. 278)

**Department of Teaching, Learning and Culture**
- Bachelor of Science in Interdisciplinary Studies, Pre-K-6, Generalist
  Certification (p. 283)
- Bachelor of Science in Interdisciplinary Studies, English Language
  Arts/Social Studies, Middle Grades Certification (p. 285)
- Bachelor of Science in Interdisciplinary Studies, Math/Science, Middle
  Grades Certification (p. 284)

**Certification**
- Secondary Graduate Certification Program (p. 286)

**Minors**

**College of Education and Human Development**
- Applied Learning-Science, Technology, Engineering and Mathematics
  (STEM) Minor (p. 287)
- Coaching Minor (p. 279)
- Creative Studies Minor (p. 257)
- Dance Minor (p. 280)
- Human Resource Development Minor (p. 251)
- Sport Management Minor (p. 280)

**Certificates**

**College of Education and Human Development**
- Creative Studies Certificate (p. 257)

**Masters**

**Department of Educational Administration
and Human Resource Development**
- Master of Science in Educational Administration
  (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/
  education-human-development/educational-administration-human
  resource-development/administration-ms)
- Master of Education in Educational Administration
  (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/
  education-human-development/educational-administration-human
  resource-development/administration-med)
- Master of Science in Educational Human Resource Development
  (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/
  education-human-development/educational-administration-human
  resource-development/human-resource-development)

**Department of Educational Psychology**
- Master of Science in Bilingual Education
  (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/
  education-human-development/educational-psychology/bilingual-ms)
- Master of Education in Bilingual Education
  (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/
  education-human-development/educational-psychology/bilingual-med)
• Master of Science in Educational Psychology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/education-human-development/educational-psychology/ms)
• Master of Education in Educational Psychology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/education-human-development/educational-psychology/med)
• Master of Science in Health Education (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/health-kinesiology/health-education-phd)
• Master of Science in Sport Management (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/education-human-development/health-kinesiology/sport-management-ms)

Department of Health and Kinesiology

• Master of Science in Athletic Training (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/education-human-development/health-kinesiology/athletic-training-ms)
• Master of Science in Health Education (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/education-human-development/health-kinesiology/health-education-ms)
• Master of Science in Special Education (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/education-human-development/educational-psychology/special-education-ms)

Department of Teaching, Learning and Culture

• Master of Science in Curriculum and Instruction (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/education-human-development/curriculum-instruction-med)
• Master of Education in Curriculum and Instruction (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/education-human-development/teaching-learning-culture/curriculum-instruction-edd)

Department of Educational Administration and Human Resource Development

• Doctor of Philosophy in Educational Administration (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/education-human-development/educational-administration-human-resource-development/administration-phd)
• Doctor of Education in Educational Administration (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/education-human-development/educational-administration-human-resource-development/administration-edd)

Department of Educational Psychology

• Doctor of Philosophy in Counseling Psychology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/education-human-development/educational-psychology/counseling-phd)
• Doctor of Philosophy in Educational Psychology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/education-human-development/educational-psychology/phd)
• Doctor of Philosophy in School Psychology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/education-human-development/educational-psychology/school-psychology-phd)

Department of Health and Kinesiology

• Doctor of Philosophy in Health Education (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/education-human-development/health-kinesiology/health-education-phd)
• Doctor of Philosophy in Kinesiology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/education-human-development/health-kinesiology/kinesiology-phd)

Department of Teaching, Learning and Culture

• Doctor of Philosophy in Curriculum and Instruction (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/education-human-development/teaching-learning-culture/curriculum-instruction-phd)
• Doctor of Education in Curriculum and Instruction (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/education-human-development/teaching-learning-culture/curriculum-instruction-edd)

Department of Educational Administration and Human Resource Development

The Department of Educational Administration and Human Resource Development prepares people for many professional careers associated with the broad fields of corporate education. The Bachelor of Science in Human Resource Development and the Bachelor of Science in Technology Management are designed to encourage students to achieve a bachelor’s degree and to enter the profession in their area of specialty. The programs prepare graduates to assume responsibility for enhancing technology, developing workplace competence and strengthening student achievement in their career paths.

Faculty

Alfred, Mary V, Professor
Educ Admn & Human Resource Dev
PhD, University of Texas, 1995
Baumgartner, Lisa M, Associate Professor
Educ Admn & Human Resource Dev
EdD, University of Georgia, 2000
PhD, The University of Georgia, 2000

Beyerlein, Michael M, Professor
Educ Admn & Human Resource Dev
PhD, Colorado State University, 1986

Core, Brandon H, Adjunct Assistant Professor
Educ Admn & Human Resource Dev
PhD, Texas A&M University, 2013

De La Garza, John, Adjunct Assistant Professor
Educ Admn & Human Resource Dev
PhD, Texas A&M University, 2011

Dirani, Khalil M, Associate Professor
Educ Admn & Human Resource Dev
PhD, University of Illinois at Urbana-Champaign, 2007

Dooley, Larry M, Associate Professor
Educ Admn & Human Resource Dev
PhD, Texas A&M University, 1989

Gundy, Anna L, Clinical Professor
Educ Admn & Human Resource Dev
PhD, Texas A&M University, 1999

Irby, Beverly J, Professor
Educ Admn & Human Resource Dev
EdD, University of Mississippi, 1983
PhD, Univ of Mississippi, 1983

Jones, Robert T, Clinical Assistant Professor
Educ Admn & Human Resource Dev
PhD, Texas A&M University, 2004

Kracht, James B, Professor
Educ Admn & Human Resource Dev
PhD, University of Washington, 1971

Lechuga, Vicente M, Associate Professor
Educ Admn & Human Resource Dev
EdD, University of Southern California, 2005
PhD, University of Southern California, 2005

Lincoln, Yvonna S, Distinguished Professor
Educ Admn & Human Resource Dev
EdD, Indiana University, 1977

Madsen, Jean A, Professor
Educ Admn & Human Resource Dev
PhD, University of Kansas, 1987

Mark, Christine L, Clinical Assistant Professor
Educ Admn & Human Resource Dev
PhD, University of Southern Mississippi, 2014

McPherson, Rebecca J, Adjunct Assistant Professor
Educ Admn & Human Resource Dev
PhD, Texas A&M University, 2012

Muller, Robert W, Clinical Associate Professor
Educ Admn & Human Resource Dev
PhD, University of Texas, 1989

Musoba, Glenda D, Associate Professor
Educ Admn & Human Resource Dev
PhD, Texas A&M University, 2004

Muyia, Machuma A, Clinical Assistant Professor
Educ Admn & Human Resource Dev
PhD, University of Arkansas, 2008

Nafukho, Fredrick M, Professor
Educ Admn & Human Resource Dev
PhD, Louisiana State University, 1998

Peck-Parrott, Kelli D, Clinical Professor
Educ Admn & Human Resource Dev
PhD, Bowling Green State University, 2000

Ponjuan, Luis, Associate Professor
Educ Admn & Human Resource Dev
PhD, University of Michigan, 2005

Sandlin, Judy R, Clinical Associate Professor
Educ Admn & Human Resource Dev
PhD, Texas A&M University, 1993

Shelton, Maria M, Adjunct Assistant Professor
Educ Admn & Human Resource Dev
EDD, Texas A&M University, 1987

Smith, Karen S, Clinical Associate Professor
Educ Admn & Human Resource Dev
EDD, Sam Houston State University, 2000

Stanley, Christine A, Professor
Educ Admn & Human Resource Dev
PhD, Texas A&M University, 1990

Tolson, Homer, Senior Professor
Educ Admn & Human Resource Dev
PhD, Purdue University, 1968

Torres, Mario S, Associate Professor
Educ Admn & Human Resource Dev
PhD, Pennsylvania State University, 2003

Wang, Jia, Associate Professor
Educ Admn & Human Resource Dev
PhD, University of Georgia, 2004

Watson, Nancy T, Clinical Associate Professor
Educ Admn & Human Resource Dev
PhD, Texas A&M University, 1998

Webb-Hasan, Gwendolyn, Associate Professor
Educ Admn & Human Resource Dev
EdD, Illinois State University, 1994
PhD, Illinois State University, 1994

Zarestky, Jill L, Clinical Assistant Professor
Educ Admn & Human Resource Dev
PhD, Texas A&M University, 2014
### Majors
- Bachelor of Science in Human Resource Development (p. 249)
- Bachelor of Science in Technology Management (p. 250)

### Minors
- Human Resource Development Minor (p. 251)

### Human Resource Development - BS

The curricula for Human Resource Development provides students with the content and course sequence to enter the workforce in either education, business or industry. The program stresses application in real settings as well as strong foundations in knowledge, and has strong field-based components. The following courses have been combined to give students a well-rounded foundation in the roles and responsibilities in education and business settings.

### Program Requirements

#### First Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>ENGL 103 or ENGL 104 Introduction to Rhetoric and Composition or Composition and Rhetoric</td>
<td>3</td>
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<tr>
<td></td>
<td>KINE 120 The Science of Basic Health and Fitness</td>
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<tr>
<td></td>
<td>MATH 141 Business Mathematics I</td>
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<td>POLS 206 American National Government</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>American history (p. 23)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Creative arts (p. 22)</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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<tr>
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<td>MATH 142 Business Mathematics II</td>
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<td>POLS 207 American National Government</td>
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<td>American history (p. 23)</td>
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<td>Life and physical sciences (p. 20)</td>
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<td></td>
<td>Social and behavioral science (p. 23)</td>
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#### Second Year

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<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>Fall</td>
<td>EHRD 203 Foundations of Human Resource Development</td>
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<td>MGMT 209 Business, Government and Society</td>
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<tr>
<td></td>
<td>Language, philosophy and culture (p. 21)</td>
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</tr>
<tr>
<td></td>
<td>Life and physical sciences (p. 20)</td>
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<td>Elective 1</td>
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<tr>
<td>Spring</td>
<td>ACCT 209 Survey of Accounting Principles</td>
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<td>COMM 203 Public Speaking</td>
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<td>EHRD 210 Legal and Ethical Environment of Human Resource Development</td>
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<td>ENGL 210 Technical and Business Writing</td>
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#### Third Year

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<tr>
<th>Semester</th>
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<td>ISYS 209 Business Information Systems Concepts</td>
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<td>EHRD 315 Applied Human Resource Development in the Workplace</td>
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<td>EHRD 374 Organizational Development</td>
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<td>EHRD 481 Capstone Seminar in Human Resource</td>
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#### Fourth Year

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<th>Course Title</th>
<th>Credit Hours</th>
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<tr>
<td>Fall</td>
<td>EHRD 408 Globalization and Diversity in the Workplace</td>
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<td></td>
<td>EHRD 413 Conflict Management and Dialogue</td>
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<td>EHRD 477 Project Management in Organizations</td>
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<td>EHRD 490 Research in Human Resource Development/Technology Management</td>
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<td>MKTG 409 Principles of Marketing</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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<tr>
<td>Spring</td>
<td>EHRD 484 Professional Internship</td>
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<td>EHRD 405 Principles and Practices of Leadership in Human Resource Development and Technology Management</td>
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<td>TCMG 402 Instructional Technology and Design</td>
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<tr>
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<td><strong>Term Semester Credit Hours</strong></td>
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</table>

**Total Semester Credit Hours:** 120

1. To be chosen in consultation with academic advisor, if necessary
2. Writing or Communication Intensive course requirement
3. Professional Phase.
4. Online course offered

Students must have completed 60 hours to register for 300/400-level courses.

Six hours of International and Cultural Diversity (p. 34) are required. Selection must be from courses on the approved list. Selection can...
be courses that also satisfy the requirement for social and behavioral sciences, creative arts, language, philosophy and culture, or electives.

Foreign Language Requirement - 2 years same foreign language in high school OR 1 full year (2 semesters) of same foreign language in college.

## Technology Management - BS

The curricula for Technology Management provides students with the content and course sequence to enter the workforce in either education, business or industry. The program stresses application in real settings as well as strong foundations in knowledge and has strong field-based components. The courses have been combined to give students a well-rounded foundation in the roles and responsibilities in education and business settings.

### Program Requirements

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<td>POLS 206 American National Government</td>
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<tr>
<td>American history elective (p. 23)</td>
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<td>Creative arts elective (p. 22)</td>
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<tr>
<td>MATH 142 Business Mathematics II</td>
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<tr>
<td>POLS 207 State and Local Government</td>
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<td>American history elective (p. 23)</td>
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<td>Life and physical sciences elective (p. 20)</td>
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<td>Fall</td>
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<tr>
<td>EHRD 203 Foundations of Human Resource Development</td>
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<td>MGMT 209 Business, Government and Society</td>
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<tr>
<td>TCMG 272 Technology and End-User Support</td>
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<tr>
<td>Language, philosophy and culture elective (p. 21)</td>
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<td>ENGL 210 Technical and Business Writing</td>
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<tr>
<td>ISYS 209 Business Information Systems Concepts</td>
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<td>TCMG 274 Distance Networking for Training and Development</td>
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<tr>
<td>EHRD 371 Applied Learning Principles</td>
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<td>EHRD 391 Measurement and Evaluation in Human Resource Development and Technology Management</td>
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<td>EHRD 477 Project Management in Organizations</td>
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<td>MGMT 309 Survey of Management</td>
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<td>TCMG 303 Unix System Administration Practices</td>
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<tr>
<td>Spring</td>
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<tr>
<td>EHRD 481 Capstone Seminar in Human Resource Development and Technology Management</td>
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<td>FINC 409 Survey of Finance Principles</td>
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<td>TCMG 308 Security and Ethics in the Digital World</td>
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<td>TCMG 316 Database Systems Administration and Application</td>
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<tr>
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<td>MKTG 409 Principles of Marketing</td>
<td>3</td>
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<td>TCMG 476 Managing Technical Networks</td>
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<tr>
<td>TCMG 412 Contemporary Issues in Technology Management</td>
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<td>EHRD 405 Principles and Practices of Leadership in Human Resource Development and Technology Management</td>
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<tr>
<td>TCMG 402 Instructional Technology and Design</td>
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</tbody>
</table>

| Total Semester Credit Hours: | 120 |

1. To be selected from University Core Curriculum.
2. To be chosen in consultation with academic advisor, if necessary.
3. Writing or Communication Intensive course requirement.
4. Professional Phase.
5. Online course offered.

Students must have completed 60 hours to register for 300- to 400-level courses.

Six hours of international and cultural diversity are required. Selection must be from courses on the approved list. Selection can be courses that also satisfy the requirement for social and behavioral sciences, creative arts, language, philosophy and culture, or electives.
Foreign Language Requirement - two years same foreign language in high school OR one full year (two semesters) of same foreign language in college.

Human Resource Development - Minor

Human Resource Development (HRD) is the process of improving learning and performance in individual, group and organization contexts through domains of expertise such as lifelong learning, career development, training and development, and organization development. A minor in HRD allows for a wider range of potential employment and accommodation to a diverse education professional experience.

Students must submit an application for admission during the following periods:

• Summer/Fall - January 13 through March 10
• Fall Semester - May 15 through June 10
• Spring Semester - September 1 through October 10

Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>EHRD 203</td>
<td>Foundations of Human Resource Development</td>
<td>3</td>
</tr>
<tr>
<td>EHRD 210</td>
<td>Legal and Ethical Environment of Human Resource Management</td>
<td>3</td>
</tr>
<tr>
<td>EHRD 372</td>
<td>Training and Development in HRD ¹</td>
<td>3</td>
</tr>
<tr>
<td>EHRD 374</td>
<td>Organizational Development ¹</td>
<td>3</td>
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<tr>
<td>Select 6 credit hours from the following:</td>
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<tr>
<td>EHRD 315</td>
<td>Applied Human Resource Development in the Workplace ¹</td>
<td></td>
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<tr>
<td>EHRD 371</td>
<td>Applied Learning Principles ¹, ²</td>
<td></td>
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<tr>
<td>EHRD 405</td>
<td>Principles and Practices of Leadership in Human Resource Development and Technology Management</td>
<td></td>
</tr>
<tr>
<td>EHRD 408</td>
<td>Globalization and Diversity in the Workplace</td>
<td></td>
</tr>
<tr>
<td>EHRD 413</td>
<td>Conflict Management and Dialogue ¹</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours: 18

¹ EHRD 203 required with a grade of C or better.
² Writing or Communication Intensive course.

Students must make a grade of C or better.

Students must have completed 60 hours to register for 300/400-level courses.

At the graduate level, the department offers the Master of Science, Master of Education and Doctor of Philosophy degrees. At the master’s level, students may emphasize educational technology; bilingual education; cognition, creativity, intelligence, and development; research, measurement and statistics; school counseling; or special education. Doctoral specializations include counseling psychology; cognition, creativity, intelligence and development; bilingual education; learning and technology; research, measurement, and statistics; school psychology; and special education.

Requirements for Admission to Professional Phase

The undergraduate curricula in the Department of Educational Psychology are composed of two phases: the pre-professional phase and the professional phase. Upon acceptance into the department, all students enter the pre-professional phase and are assigned a lower-division classification (EDIS). The pre-professional phase consists of University Core Curriculum requirements and introductory courses to the major field of study. After successful completion of these requirements, students are eligible to apply for admission into the professional phase. Cohorts in bilingual and special education are limited in number and students are admitted on a competitive basis. The application process is competitive, and meeting the minimum program prerequisites does not guarantee admission to the professional phase. If admitted to the professional phase of the program, students will be assigned an upper-level classification (INST). The professional phase consists of advanced work in the major field of study and professional development courses, with field-based experiences.

Requirements for Admission to the Professional Phase of Teacher Education Programs

The State of Texas establishes standards for teacher education programs. All certification programs at Texas A&M are in compliance with these requirements. Students must meet state, University, College of Education and Human Development and department/program requirements for matriculation into a teacher education program. Below are the requirements for the traditional certification program. Students are responsible for contacting a departmental advisor to obtain information about specific requirements for majors and program areas, as some programs have requirements beyond those listed below. University-wide requirements for admission to teacher education include the following:

1. An approved degree plan or certification and teaching field plan(s).
2. Minimum GPR of 2.75 for the special education program and 2.75 for the bilingual education program based on all coursework completed at Texas A&M University. (See departmental advisor for additional grade requirements.)
3. Completion of all required University core courses.
4. A grade of B or higher in all certification courses. (See departmental advisor for additional grade requirements).
5. Satisfaction of English proficiency requirement by:
   a. Earning a grade of B or higher in ENGL 103 or ENGL 104 (or receiving credit by exam for the course); or
   b. Earning a grade of B or higher in ENGL 210, ENGL 235 or ENGL 241; and
   c. Earning no grade below C in any course taken in (a) or (b) above.
6. Pass the THEA, ACCUPLACER, ASSET or COMPASS test or show proof of exemption from the test with appropriate STAAR, SAT or ACT scores.
7. Oral interview required for admission to upper level for Hispanic Bilingual Education.
8. Documentation of foreign language and computer literacy requirements on file in the Texas A&M University Office of Admissions.
9. Transcripts from all institutions of higher education on file in the Texas A&M University Office of Admissions.

Requirements for Admission to Student Teaching
1. Successful admission to Professional Phase of Teacher Education.
2. Complete Application for Student Teaching by the given deadlines for each semester.
3. Completion of all courses listed on the degree plan. All coursework must have a grade of C or better. See departmental advisor for additional grade requirements.
4. A minimum GPR of 3.0 in upper-level courses in Special Education. See departmental advisor for additional grade requirements.
5. A minimum GPR of 2.5 on all coursework completed at Texas A&M. See departmental advisor for additional grade requirements.
6. Satisfaction of Spanish proficiency requirements (Hispanic Bilingual Education ONLY).
7. In addition to #6, satisfactory performance on the written and oral Spanish proficiency component of the Hispanic Bilingual Education program admission process.

Faculty
Acosta, Sandra T, Assistant Professor
Educational Psychology
PhD, Texas A&M University, 2010

Benz, Michael R, Professor
Educational Psychology
PhD, University of Oregon, 1983

Blake, Jamilia J, Associate Professor
Educational Psychology
PhD, University of Georgia, 2007

Brossart, Dan F, Associate Professor
Educational Psychology
PhD, University of Missouri, 1996

Burke, Mack D, Associate Professor
Educational Psychology
PhD, University of Oregon, 2001

Burke, Shanna H, Associate Professor
Educational Psychology
PhD, University of Oregon, 1998

Byrns, Glenda E, Clinical Associate Professor
Educational Psychology
PhD, Texas A&M University, 2007

Castillo, Linda G, Professor
Educational Psychology
PhD, University of Utah, 1999

Clemens, Nathan H, Assistant Professor
Educational Psychology
PhD, Lehigh University, 2009

Cook, Krystal T, Clinical Associate Professor
Educational Psychology
PhD, Texas A&M University, 2009

Elliott, Timothy R, Professor
Educational Psychology
PhD, University of Missouri, 1987

Fournier, Constance J, Clinical Professor
Educational Psychology
PhD, University of Texas, Austin, 1987

Ganz, Jennifer, Professor
Educational Psychology
PhD, University of Kansas, 2002

Grenwelge, Cheryl H, Assistant Professor & Extension Specialist
Educational Psychology
PhD, Texas A&M University, 2010

Hall, Robert J, Associate Professor
Educational Psychology
PhD, University of California, Los Angeles, 1979

Heath, Amy K, Adjunct Assistant Professor
Educational Psychology
PhD, Texas A&M University, 2012

Hughes, Jan N, Professor
Educational Psychology
PhD, University of Texas, Austin, 1976

Hutchins, Nancy S, Instructional Assistant Professor
Educational Psychology
PhD, Texas A&M University, 2014

Juntune, Joyce E, Instructional Associate Professor
Educational Psychology
PhD, Texas A&M University, 1997

Kwok, Oi-Man, Professor
Educational Psychology
PhD, Arizona State University, 2005

Lara-Alecio, Rafael, Professor
Educational Psychology
PhD, University of Utah, 1991

Liew, Jeffrey C, Professor
Educational Psychology
PhD, Arizona State University, 2005

Luo, Wen, Associate Professor
Educational Psychology
PhD, Texas A&M University, 2007

Lynch, Patricia S, Clinical Professor
Educational Psychology
PhD, Texas A&M University, 1992
Montague, Marcia L, Adjunct Assistant Professor
Educational Psychology
PhD, Texas A&M University, 2009

Ompendoguelet, Lizette O, Associate Professor
Educational Psychology
PhD, University of Missouri, 2009

Padron, Yolanda, Professor
Educational Psychology
EdD, University of Houston, 1985
PhD, University of Houston, 1985

Palmer, Douglas J, Professor
Educational Psychology
PhD, University of California, Los Angeles, 1977

Pedersen, Susan J, Associate Professor
Educational Psychology
PhD, University of Texas, Austin, 2000

Perrott, Lisa J, Associate Professor
Educational Psychology
PhD, University of Virginia, 2001

Rae, William A, Clinical Professor
Educational Psychology
PhD, University of Texas, Austin, 1975

Riccio, Cynthia A, Professor
Educational Psychology
PhD, University of Georgia, 1993

Ridley, Charles R, Professor
Educational Psychology
PhD, University of Minnesota, 1978

Rispoli, Mandy J, Associate Professor
Educational Psychology
PhD, University of Texas, Austin, 2009

Rivera, Hector H, Assistant Professor
Educational Psychology
PhD, University of California, Santa Cruz, 2001

Simmons, Deborah C, Professor
Educational Psychology
PhD, Purdue University, 1986

Sohn McCormick, Anita L, Adjunct Assistant Professor
Educational Psychology
PhD, Texas A&M University, 2000

Stough, Laura M, Associate Professor
Educational Psychology
PhD, University of Texas, 1993

Sweany, Noelle W, Clinical Associate Professor
Educational Psychology
PhD, University of Texas, Austin, 1999

Sweet, Kayla S, Assistant Lecturer
Educational Psychology
MEd, Texas A&M University, 2006

Thompson, Bruce, Distinguished Professor
Educational Psychology
EdD, University of Houston, 1978
PhD, University of Houston, 1978

Tong, Fuhui, Associate Professor
Educational Psychology
PhD, Texas A&M University, 2006

Vannest, Kimberly J, Professor
Educational Psychology
PhD, Louisiana State University, 2000

Walichowski, Miranda F, Clinical Associate Professor
Educational Psychology
PhD, Texas A&M University, 2009

Willson, Victor L, Professor
Educational Psychology
PhD, University of Colorado, 1973

Woltering, Steven, Assistant Professor
Educational Psychology
PhD, University of Toronto, 2012

Woodward, Robert S, Clinical Assistant Professor
Educational Psychology
PhD, Texas A&M University, 2004

Yoon, Myeongsun, Associate Professor
Educational Psychology
PhD, Arizona State University, 2007

Yue, Xiaohui, Instructional Assistant Professor
Educational Psychology
PhD, Virginia Polytechnic Institute and State University, 2011

Zhang, Dan D, Professor
Educational Psychology
DVM, University of New Orleans, 1998
PhD, University of New Orleans, The, 1998

Majors

- Bachelor of Science in Interdisciplinary Studies, Bilingual Education-EC-6 (p. 253)
- Bachelor of Science in Interdisciplinary Studies, Special Education-EC-12 (p. 255)
- Bachelor of Science in University Studies, Child Professional Services Concentration (p. 256)

Minors

- Creative Studies Minor (p. 257)

Certificates

Creative Studies Certificate (p. 257)

Interdisciplinary Studies - BS, Bilingual Education EC-6

The Department of Educational Psychology offers an undergraduate degree program in Interdisciplinary Studies that includes certification in bilingual education and general elementary education, grades EC
through 6. This program prepares teachers to instruct students who are served in bilingual classes at the elementary level. Students interested in certification in bilingual education should contact the EPSY undergraduate advisor in Heaton Hall.

**Program Requirements**

The following curriculum leads to the Bachelor of Science degree in Interdisciplinary Studies with certification in Bilingual Education, EC-6. Students are required to meet with their assigned academic advisor prior to registration each semester.

**First Year**

<table>
<thead>
<tr>
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<tr>
<td>Fall</td>
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<tr>
<td>ENGL 103 or ENGL 104</td>
<td>Introduction to Rhetoric and Composition or Composition and Rhetoric</td>
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<td>HIST 105 or HIST 106</td>
<td>History of the United States or History of the United States</td>
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<td>MATH 141 or MATH 166</td>
<td>Business Mathematics I or Topics in Contemporary Mathematics II</td>
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<tr>
<td>POLS 206</td>
<td>American National Government</td>
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<td>Creative arts elective (p. 22)</td>
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<td>Writing about Literature or Technical and Business Writing</td>
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<td>HIST 226</td>
<td>History of Texas</td>
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<td>MATH 131 or MATH 142</td>
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<td>Life and physical sciences elective</td>
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<tr>
<td>BIOL 101</td>
<td>Botany</td>
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<td>BIOL 107</td>
<td>Zoology</td>
</tr>
<tr>
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<td>Introductory Biology I</td>
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<td>BIOL 113</td>
<td>Essentials in Biology</td>
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<td>Structure of Mathematics II</td>
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<td>BEFB 472</td>
<td>Bilingual and Dual Language Methodologies</td>
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<td>Teaching Reading Through Children's Literature</td>
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<td>SPAN 411</td>
<td>Contemporary Hispanic Society and Culture</td>
</tr>
<tr>
<td>College of Education and Human Development</td>
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</tbody>
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| SPAN 413 | Hispanic Culture through Art |
| SPAN 421 | Spanish Language Poetry |
| SPAN 445 | Cervantes |
| SPAN 450 | Contemporary Spanish and Spanish-American Literature |

| Term Semester Credit Hours | 15 |

| Summer |
| EPSY 435 or STAT 303 | Educational Statistics or Statistical Methods | 3 |

| Fourth Year |
| Fall |
| RDNG 467 | Reading and the Language Arts | 3 |
| TEFB 410 | Social Studies and the Humanities in the Elementary School | 3 |
| TEFB 412 | Mathematics in the Elementary School | 3 |
| TEFB 413 | Science in the Elementary School | 3 |

| Term Semester Credit Hours | 12 |

| Spring |
| BEFB 425 | Student Teaching in Hispanic Bilingual Education | 3 |
| BEFB 426 | Effective Instruction of Hispanic Students of Diverse Abilities | 3 |

| Term Semester Credit Hours | 6 |

| Total Semester Credit Hours: | 124 |

**Interdisciplinary Studies - BS, Special Education EC-12**

The Department of Educational Psychology offers an undergraduate degree program in Interdisciplinary Studies that includes certification in special education, EC through grade 12, within the constraints of Texas Certification and The Elementary and Secondary Education Act mandates. This program prepares teachers to instruct students who are served by special education services. Graduates will be prepared to work with students in a wide range of grade levels and settings, serving students with mild to severe disabilities. Students interested in certification in Special Education should contact the EPSY undergraduate advisor in Heaton Hall.

**Program Requirements**

The following curriculum leads to a Bachelor of Science degree in Interdisciplinary Studies with certification in Special Education K-12. Students are required to meet with their assigned academic advisor prior to registration each semester.

| First Year |
| Fall |
| ENGL 103 or ENGL 104 | Introduction to Rhetoric and Composition or Composition and Rhetoric | 3 |
| HIST 105 or HIST 106 | History of the United States or History of the United States | 3 |

| Semester Credit Hours | 3 |

| MATH 141 or MATH 166 | Business Mathematics I or Topics in Contemporary Mathematics II | 3 |
| POLS 206 | American National Government | 3 |
| Life and physical sciences elective | 4 |

Select one of the following:

- BIOL 101 | Botany |
- BIOL 107 | Zoology |
- BIOL 111 | Introductory Biology I |
- BIOL 113 | Essentials in Biology |

| Term Semester Credit Hours | 16 |

| Summer |
| ENGL 203 or ENGL 210 | Writing about Literature or Technical and Business Writing | 3 |

| Second Year |
| Fall |
| EPFB 210 | Family Involvement and Empowerment | 3 |
| EPSY 320 or EPSY 321 | Child Development or Adolescent Development | 3 |
| KINE 120 | The Science of Basic Health and Fitness | 1 |
| MATH 365 | Structure of Mathematics I | 3 |
| TEFB 273 | Introduction to Culture, Community, Society and Schools | 3 |
| Creative arts elective (p. 22) | 3 |

| Term Semester Credit Hours | 16 |

| Spring |
| EPSY 484 | Field Experiences | 1 |
| HLTH 214/KINE 214 | Health and Physical Activity for Children | 3 |
| INST 222 | Foundations of Education in a Multicultural Society | 3 |
| INST 362 | English as a Second Language Methods I | 3 |
| MATH 366 | Structure of Mathematics II | 3 |

| Term Semester Credit Hours | 16 |
### University Studies - BS, Child Professional Services Non-Certification Program

The Department of Educational Psychology offers an undergraduate non-certification degree program in University Studies with an area of concentration in Child Professional Services. This degree is a flexible 120-hour degree program that enables a student to combine a prescribed concentration, two minors, the core curriculum and electives to create a comprehensive degree that aligns with the student’s individual professional interest. The Child Professional Services non-certification concentration requires students to complete a minor in Human Resource Development or Creative Studies and Sociology. This concentration does not allow students to seek teacher certification; however, it offers study in upper level education courses that provides a strong foundation in child and adolescent development, instructional methods, educational psychology, kinesiology, human resource development, and sociology as a means of preparing graduates for careers in civic, social or religious organizations; hospitals or non-profit organizations; or family and community services. Students interested in University Studies - Child Professional Services should contact the EPSY undergraduate advisor located in Heaton Hall.

<table>
<thead>
<tr>
<th>Program Requirements</th>
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</thead>
<tbody>
<tr>
<td>The following curriculum leads to a Bachelor of Science degree in University Studies with an area of concentration in Child Professional Services. Students are required to meet with their assigned academic advisor prior to registration each semester.</td>
</tr>
</tbody>
</table>

### First Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Fall</th>
<th>Spring</th>
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<tr>
<td><strong>Credit Hours</strong></td>
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<td><strong>3</strong></td>
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<tr>
<td><strong>ENGL 103 or ENGL 104</strong></td>
<td><strong>Composition and Rhetoric</strong></td>
<td><strong>ENGL 103 or ENGL 104</strong></td>
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<tr>
<td><strong>HIST 105</strong></td>
<td><strong>History of the United States</strong></td>
<td><strong>MATH 141 or MATH 166</strong></td>
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<td><strong>MATH 141 or MATH 166</strong></td>
<td><strong>Contemporary Mathematics II</strong></td>
<td><strong>POLS 206</strong></td>
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<tr>
<td><strong>POLS 206</strong></td>
<td><strong>American National Government</strong></td>
<td><strong>Life and Physical sciences elective (p. 20)</strong></td>
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<th>Term Semester Credit Hours</th>
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<tr>
<th>Semester</th>
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<tr>
<td><strong>Credit Hours</strong></td>
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<tr>
<td><strong>ENGL 103 or ENGL 104</strong></td>
<td><strong>Composition and Rhetoric</strong></td>
<td><strong>ENGL 103 or ENGL 104</strong></td>
</tr>
<tr>
<td><strong>HIST 105</strong></td>
<td><strong>History of the United States</strong></td>
<td><strong>MATH 141 or MATH 166</strong></td>
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<tr>
<td><strong>MATH 141 or MATH 166</strong></td>
<td><strong>Contemporary Mathematics II</strong></td>
<td><strong>POLS 206</strong></td>
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### Second Year

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<tr>
<td><strong>EHRD 203</strong></td>
<td><strong>Foundations of Human Resource Development</strong></td>
<td><strong>INST 210</strong></td>
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<tr>
<td><strong>INST 210</strong></td>
<td><strong>Understanding Special Populations</strong></td>
<td><strong>IN 222</strong></td>
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<td><strong>IN 222</strong></td>
<td><strong>Foundations of Education in a Multicultural Society</strong></td>
<td><strong>KINE 120</strong></td>
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<td><strong>KINE 120</strong></td>
<td><strong>The Science of Basic Health and Fitness</strong></td>
<td><strong>KINE 120</strong></td>
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<td>Third Year</td>
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<td>SOCI minor elective ²</td>
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<td>Elective ¹</td>
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<td>Fourth Year</td>
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<td>Fall</td>
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<td>Elective ¹</td>
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<td>Elective ¹</td>
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<td>Elective ¹</td>
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<td>EHRD 372</td>
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<td>Spring</td>
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<tr>
<td>Elective ¹</td>
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<td>EHRD 405,</td>
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<td>EHRD 408, or</td>
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<td>EHRD 413</td>
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<tr>
<td>Total Semester Credit Hours:</td>
<td>120</td>
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</table>

1. Free elective can be chosen from any 300-400 level course of student's choice.
2. Sociology minor elective to be selected from approved list of courses in the Department of Sociology (p. 493).

Creative Studies - Minor

The Creative Studies minor is provides knowledge and strategies to help you think more creatively within the area of your future profession. Everyone has the ability to think more creatively. Our job is to help you develop and grow your creative ability. Creativity changes the way you think about personal and professional situations.

Program Requirements

- EPSY 430 Creativity Theories and Research 3
- EPSY 433 Lateral Thinking 3
- Select one of the following options: 9
  - Option 1
    - Select three of the following:
      - ENDS 101 Design Process
      - EPSY 431 Personal Creativity and Giftedness
      - EPSY 432 Creativity and Creative Problem Solving
      - EPSY 485 Directed Studies
  - Option 2
    - Select two of the following:
      - ENDS 101 Design Process
      - EPSY 431 Personal Creativity and Giftedness
      - EPSY 432 Creativity and Creative Problem Solving
      - EPSY 485 Directed Studies
    - Select one of the following:
      - ARTS 111 Drawing I
      - ARTS 115 Drawing for Visualization
      - ENDS 115 Design Communication Foundations
      - ENGL 347 Writers' Workshop: Prose
      - ENGL 348 Writers' Workshop: Poetry
      - EPSY 459 Practicum in Educating the Gifted and Talented
      - HORT 203 Floral Design
      - MKTG 345 Social Media and Public Relations
      - MKTG 442 Innovation and Product Management

Total Semester Credit Hours: 15

Creative Studies - Certificate

The Department of Educational Psychology offers a certificate in Creative Studies.

Program Requirements

- Theory of Creativity
  - Select one of the following: 3
    - ENDS 101 Design Process
- PSYC 489 Special Topics in... (Creative Theory and Research)
- Personal Creativity
The Department of Health and Kinesiology offers degrees in Health, Kinesiology, Sport Management and University Studies. Several tracks are offered for students who are interested in a career in these fields. All students majoring in the Department of Health and Kinesiology are assigned an advisor in accordance with their career choice.

The curricula in Health, Kinesiology, Sport Management and University Studies offer opportunities to obtain professional preparation for careers as health and physical education teachers in public and private schools, coaches, sport administrators, community health educators, clinical and applied exercise physiologists, exercise scientists, recreational leaders (in non-school agencies), dance scientists, sports marketing professionals and athletic administrators. The department also provides academic preparation for students interested in allied health and medical related professional schools, e.g., physical therapy, occupational therapy, physicians’ assistant or medicine.

The Department of Health and Kinesiology also offers minors in coaching, dance and sport management. The coaching and dance minors consist of 18 credit hours. The sport management minor is 15 credit hours. A list of courses and enrollment information regarding the minor may be obtained from the Advising Office in the Department of Health and Kinesiology.

The Department of Health and Kinesiology also offers the Master of Education, Master of Science, Doctor of Education and Doctor of Philosophy degrees.

**Teacher Certification**

Students majoring in either Health or Kinesiology may qualify for a Provisional Teaching Certificate after being admitted to teacher education, completing the prescribed requirements, and being recommended by the department to the Texas Education Agency through the University’s Council for Teacher Education. Completion of this degree and other academic requirements does not automatically assure that the student will be recommended for a teaching certificate. Students interested in Texas certification for a teaching career must apply for, and be admitted to, the professional phase of teacher education. See the section entitled “Requirements for Admission to the Professional Phase of Teacher Education” for additional information. Students should see an academic advisor for specific courses. Additionally, all core curriculum courses must be completed before the student accrues 90 hours.

**Non-Teacher Certification Tracks**

Students may seek a career other than public school teaching. The department offers opportunities in allied health, community health, dance, exercise science, motor behavior and sport management. Students are encouraged to declare career intentions early so that appropriate coursework and field experiences may be planned. Students pursuing careers other than teaching are not eligible for teacher certification. These opportunities are briefly summarized in the descriptions of each track.

Students interested in obtaining a degree must apply for, and be admitted to, the professional phase of a specific track (i.e., exercise science, sport management, community health, allied health or dance science). See the section entitled “Requirements for Admission to the Professional Phase of Non-Certification Tracks (p. 244)” for additional information.

**Departmental Advising**

Because of the wide variety of careers in Health, Kinesiology and Sport Management and the difference in course requirements for each, it is essential for students to take advantage of the advising opportunities offered by the department. Students are assigned to an academic advisor in accordance with their degree choice. Students are encouraged to declare career intentions early so appropriate coursework may be planned. All undergraduate advising matters are handled by the advisors in the department’s Advising Office. Information concerning entrance to professional schools in health-related fields is available from the Office of Professional School Advising.

Students are encouraged to become involved in professional organizations and extracurricular activities that afford opportunities for becoming involved in their respective professions.

**General Requirements for Admission to Professional Phase**

The curricula in the Department of Health and Kinesiology are composed of two phases: the pre-professional phase and the professional phase. Upon acceptance into the department, all students enter the pre-professional phase and are assigned a lower-division classification in Health (EDHL), Kinesiology (EDKI) or Sport Management (EDSM). The pre-professional phase consists of University Core Curriculum requirements and introductory courses to the major field of study. After successful completion of these requirements, students may be accepted into the professional phase and assigned an upper-level classification in Health (HLTH), Kinesiology (KINE) or Sport Management (SPMT). The professional phase consists of advanced work in the major field of study and professional development courses. Students are not guaranteed automatic admission to the professional phase.

**Requirements for Admission to the Professional Phase of Teacher Education**

The State of Texas establishes standards for teacher education. All certification programs at Texas A&M University are in compliance with these requirements. Students must meet State, University, College of Education and Human Development and department/program requirements for matriculation into teacher education. Students are responsible for contacting the Advising Office in the Department of Health and Kinesiology to obtain information about specific requirements, which include the following.

1. Complete the following communication requirement:
   a. Physical Education: Complete ENGL 103 or ENGL 104 and ENGL elective with a grade combination of B/C or higher.
2. Complete the following courses with a grade of C or better:

a. **Physical Education**
   - BIOL 107 Zoology 4
   - KINE 121 Physical and Motor Fitness Assessment 2
   - KINE 213 Foundations of Kinesiology 3
   - KINE 199 Required Physical Activity (Majors) 2
   - KNFB 222/HEFB 222 Teaching and Schooling in Modern Society 3
   - MATH (p. 20) 3
   - PHYS 201 College Physics 4

b. **School Health**
   - BIOL 107 Zoology 4
   - or BIOL 111 or Introductory Biology I
   - CHEM 101 Fundamentals of Chemistry I 4
   - & CHEM 111 Fundamentals of Chemistry Laboratory I 4
   - HEFB 222/KNFB 222 Teaching and Schooling in Modern Society 3
   - HLTH 210 Introduction to the Discipline 3
   - HLTH 231 Healthy Lifestyles 3
   - MATH (p. 20) 3

3. GPR requirements:
   a. Overall 2.75 on all coursework taken at any institution of higher education.
   b. Once admitted into professional phase, students must maintain a minimum GPR of 2.5 or higher in the following areas: overall at Texas A&M University, on all degree plan coursework, on all professional development coursework and on major coursework.
   c. A grade of C or better must be made in each of the following: science, professional development, major and support field courses (those courses taken at Texas A&M and those taken elsewhere and transferred to Texas A&M).

4. A grade of C or better must be made in each of the following: science, professional development, major and support field courses (those courses taken at Texas A&M and those taken elsewhere and transferred to Texas A&M).

5. Pass the THEA, ACCUPLACER, ASSET or COMPASS test or show proof of exemption from the test with appropriate STAAR, SAT or ACT scores.

6. Complete application for the professional phase of teacher education before the deadline during the semester all above criteria are met (see academic advisor for date). Application for professional phase includes documentation of professional organizations and certificates, Code of Ethics, FERPA acknowledgement and Expectation for Professional Behavior form signed by student and program coordinator.

7. Demonstrate swimming proficiency (for KINE majors).

**NOTE:** Undergraduate students enrolled in professional phase of teacher preparation programs incur a differential tuition charge of $300 in each of the remaining semesters.

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### Requirements for Admission to Student Teaching

1. Successful admission to Professional Phase of Teacher Education.
2. Complete Intent to Student Teach form at the time of application for professional phase.
3. Complete all degree plan coursework except KNFB 450/HEFB 450/KNFB 450.
4. **GPR requirements:**
   a. minimum of 2.5 on all coursework completed at Texas A&M.
   b. minimum of 2.5 on all coursework that applies to the degree plan.
   c. minimum of 2.5 computed for each: professional development and major courses.

5. A grade of C or better must be made in each of the following: science, professional development, major and support field courses (those courses taken at Texas A&M and those taken elsewhere and transferred to Texas A&M).


7. Successful completion of the English Language Learner and Ethics Training Module.

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### Requirements for Admission to the Professional Phase of Non-Certification Tracks

The following requirements must be met by students seeking admission to the professional phase of non-certification tracks in Health and Kinesiology. Students are responsible for contacting the Advising Office in the Department of Health and Kinesiology to obtain information about specific requirements.

1. Complete the following courses with a grade combination of B/C or higher:
   a. **Kinesiology**
      - ENGL 103 Introduction to Rhetoric and Composition 3
      - or ENGL 104 Composition and Rhetoric
      - Second Communications/English course. 3
   
   b. **Health**
      - ENGL 103 Introduction to Rhetoric and Composition 3
      - or ENGL 104 Composition and Rhetoric
      - COMM 203 Public Speaking 3
      - or COMM 205 Communication for Technical Professions

   c. **Sport Management**
      - ENGL 103 Introduction to Rhetoric and Composition 3
      - or ENGL 104 Composition and Rhetoric
      - Select one of the following:
        - COMM 203 Public Speaking
        - COMM 205 Communication for Technical Professions
2. Complete the following courses with a grade of C or better:
   a. **Allied Health**
      - BIOL 107 Zoology 4
      - BIOL 111 Introductory Biology I 4
      - BIOL 319 Integrated Human Anatomy and Physiology I 4
      - BIOL 320 Integrated Human Anatomy and Physiology II 4
      - CHEM 101 Fundamentals of Chemistry I 4
      - CHEM 111 and Fundamentals of Chemistry Laboratory I 4
      - HLTH 210 Introduction to the Discipline 3
      - HLTH 231 Healthy Lifestyles 3
      - HLTH 240/ KINE 240 Computer Technology in Health and Kinesiology 3
      - MATH (p. 860) 3
   
   b. **Community Health**
      - BIOL 107 Zoology 4
      - BIOL 111 Introductory Biology I 4
      - BIOL 319 Integrated Human Anatomy and Physiology I 4
      - BIOL 320 Integrated Human Anatomy and Physiology II 4
      - CHEM 101 Fundamentals of Chemistry I 4
      - CHEM 111 and Fundamentals of Chemistry Laboratory I 4
      - HLTH 210 Introduction to the Discipline 3
      - HLTH 231 Healthy Lifestyles 3
      - HLTH 240/ KINE 240 Computer Technology in Health and Kinesiology 3
      - HLTH 331 Community Health 3
      - MATH (p. 860) 3
   
   c. **Kinesiology: Dance Science**
      - BIOL 107 Zoology 4
      - BIOL 319 Integrated Human Anatomy and Physiology I 4
      - BIOL 320 Integrated Human Anatomy and Physiology II 4
      - MATH 141 Business Mathematics I 3
      - PHYS 201 College Physics 4
      - KINE 213 Foundations of Kinesiology 3
      - PSYC 107 Introduction to Psychology 3
   
   d. **Kinesiology: Exercise Science**
      - BIOL 111 Introductory Biology I 4
      - BIOL 319 Integrated Human Anatomy and Physiology I 4
      - BIOL 320 Integrated Human Anatomy and Physiology II 4
      - CHEM 101 Fundamentals of Chemistry I 4
      - CHEM 111 and Fundamentals of Chemistry Laboratory I 4
      - KINE 121 Physical and Motor Fitness Assessment 2
      - KINE 213 Foundations of Kinesiology 3
      - MATH 131 Mathematical Concepts—Calculus 3
      - MATH 141 Business Mathematics I 3
      - PHYS 201 College Physics 4

3. Complete the following courses with a grade of B or better:
   a. **Dance Science**
      - DCED 160 Ballet I 2
      - DCED 171 Modern Dance I 2
      - KINE 260 Movement Lab: Ballet I 2
      - KINE 271 Movement Lab: Modern Dance I 2

4. Minimum of 2.5 on all coursework completed at Texas A&M except Sport Management which requires a 2.25. Dance Science requires a 2.5 on all dance science coursework for admission to the professional phase.

5. Applied Exercise Physiology and Sport Management have additional requirements. Please see your academic advisor for these.

6. Admission to the professional phase is competitive and not guaranteed. Students must meet with their advisor regarding admission to professional phase.

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**Requirements for Admission to Internship**

1. Successful admission to Professional Phase of Non-Certification Track.
2. Submit the Application for Internship form prior to the deadline (March 1, July 1, October 1) the semester before enrolling in pre-intern courses.
3. Minimum 2.5 on all coursework completed at Texas A&M except Sport Management which requires a 2.00.
4. Health and Kinesiology requires a grade of C or better must be made in each of the following: science, professional development and major courses (those courses taken at Texas A&M and those taken elsewhere and transferred to Texas A&M).
5. Complete all degree plan courses prior to internship experience.
6. Approval of Application for Internship by program coordinator.

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**Faculty**

- Agnor, Dottiedee, Instructional Associate Professor
  Health & Kinesiology
  MS, Texas A&M University, 1992
- Apostolopoulos, Yiorgos, Associate Professor
  Health & Kinesiology
  PhD, University of Connecticut, 1994
- Armstrong, Carisa L, Clinical Associate Professor
  Health & Kinesiology
  MA, Case Western Reserve University, 2002
- Ballard, Danny J, Adjunct Professor
  Health & Kinesiology
  PhD, Oklahoma State University, 1982
- Ballouli, Khalid W, Adjunct Assistant Professor
  Health & Kinesiology
  PhD, Texas A&M University, 2011
Barry, Adam, Associate Professor
Health & Kinesiology
PhD, Texas A&M University, 2007

Batista, Paul J, Associate Professor
Health & Kinesiology
JD, Baylor University, 1976

Bedford, Diane C, Clinical Assistant Professor
Health & Kinesiology
MFA, Florida State University, 2010

Bennett, Gregg R, Professor
Health & Kinesiology
EDD, Auburn University, 1997

Bergeron, Christine S, Clinical Associate Professor
Health & Kinesiology
PhD, Florida State University, 1998

Berthot, Patricia A, Instructional Associate Professor
Health & Kinesiology
MED, Stephen F. Austin State University, 1990

Bloomfield, Susan A, Professor
Health & Kinesiology
EDD, Ohio State University, 1992

Bosquez, Janet M, Instructional Assistant Professor
Health & Kinesiology
MS, Texas A&M University, 1986

Boucher, Anthony M, Clinical Associate Professor
Health & Kinesiology
PhD, Texas Women's University, 2008

Brekken, Kirstin L, Instructional Professor
Health & Kinesiology
MS, Texas A&M University, 1982

Buchanan, John J, Professor
Health & Kinesiology
PhD, Florida Atlantic University, 1996

Chapman, Denise D, Instructional Assistant Professor
Health & Kinesiology
MS, University of Central Missouri, 2000

Chen, Lei-Shih, Associate Professor
Health & Kinesiology
PhD, Texas A&M University, 2007

Clark, Heather R, Clinical Assistant Professor
Health & Kinesiology
PhD, Texas A&M University, 2014

Coady, William J, Instructional Associate Professor
Health & Kinesiology
MS, Texas A&M University, 1992

Crouse, Stephen F, Professor
Health & Kinesiology
PhD, University of New Mexico, 1984

Cunningham, George B, Professor
Health & Kinesiology
PhD, Ohio State University, 2002

Dannenbaum, Joseph H, Instructional Associate Professor
Health & Kinesiology
MA, Oklahoma State University, 2005

Darnell, Gayden S, Instructional Associate Professor
Health & Kinesiology
MS, Texas A&M University, 1997

Deutz, Nicolaas, Professor
Health & Kinesiology
PhD, University of Amsterdam, 1988

Dixon, Mary O, Visiting Assistant Professor
Health & Kinesiology
PhD, Texas A&M University, 2011

Dubuisson, Lydia M, Instructional Associate Professor
Health & Kinesiology
MS, Texas A&M University, 1999

Eliot, John F, Clinical Associate Professor
Health & Kinesiology
PhD, Ohio State University, 1998

Ellis, Robert B, Instructional Assistant Professor
Health & Kinesiology
BA, Oklahoma State University, 1964

Engelen, Marielle P, Associate Professor
Health & Kinesiology
PhD, Maastricht University, Netherlands, 2000

Fluckey, James D, Professor
Health & Kinesiology
PhD, Pennsylvania State University, 1995

Francique, Akila R, Assistant Professor
Health & Kinesiology
PhD, University of Georgia, 2008

Gabbard, Carl P, Professor
Health & Kinesiology
EDD, North Texas State University, 1977

Gomez, Daniel, Instructional Assistant Professor
Health & Kinesiology
MEd, Texas A&M University, 2010

Gomez, Lorinda B, Instructional Associate Professor
Health & Kinesiology
MS, Texas A&M University, 2006

Goodson, Patricia, Professor
Health & Kinesiology
PhD, University of Texas, 1996

Grant, Melinda L, Instructional Professor
Health & Kinesiology
MS, West Virginia University, 1976
Green, John S, Clinical Professor
Health & Kinesiology
PhD, Texas A&M University, 1996

Green, Lisa L, Adjunct Assistant Professor
Health & Kinesiology
PhD, Texas Women's University, 2001

Greenwood, C Michael, Clinical Professor
Health & Kinesiology
PhD, Texas Woman's University, 1990

Greenwood, Lori, Clinical Professor
Health & Kinesiology
PhD, Oregon State University, 1995

Guidry, Jeffrey J, Associate Professor
Health & Kinesiology
PhD, University of Texas Health Science Center at Houston, 1994

Gunnels, Emily E, Lecturer
Health & Kinesiology
MS, Texas A&M University, 2005

Hanik, Michael G, Instructional Assistant Professor
Health & Kinesiology
MS, Northwestern State University of Louisiana, 1996

Harvey, Idethia S, Associate Professor
Health & Kinesiology
PhD, University of Pittsburgh, 2014

Henthorne, Mary B, Instructional Assistant Professor
Health & Kinesiology
MS, Texas A&M University, 2008

Hourahan, Johanna E, Instructional Associate Professor
Health & Kinesiology
MEd, Texas A&M University, 2008

Hudson, Shane L, Clinical Associate Professor
Health & Kinesiology
PhD, Texas A&M University, 2007

Jones-Mckyer, Ellisa L, Associate Professor
Health & Kinesiology
PhD, Indiana University, 2005

Keiper, Paul, Clinical Associate Professor
Health & Kinesiology
EDD, Texas A&M University, 2002

Kirkham, Ernest P, Instructional Associate Professor
Health & Kinesiology
MS, Texas A&M University, 1981

Kniffin, Daniel A, Instructional Associate Professor
Health & Kinesiology
MEd, University of Texas, Austin, 1987

Kreider, Richard, Professor
Health & Kinesiology
PhD, University of Southern Mississippi, 1987

Lawler, John, Professor
Health & Kinesiology
PhD, University of Florida, 1991

Lemke, Michael K, Clinical Assistant Professor
Health & Kinesiology
PhD, Wichita State University, 2013

Lightfoot, John, Professor
Health & Kinesiology
PhD, University of Tennessee, 1986

Linz, Leah E, Instructional Assistant Professor
Health & Kinesiology
MS, Texas A&M University, 2003

Lockard, Brittanie L, Adjunct Assistant Professor
Health & Kinesiology
MS, East Carolina University, 2004

Locklear, Alyssa D, Instructional Associate Professor
Health & Kinesiology
MA, Texas A&M University, 2003

Markowsky, Vicki J, Instructional Professor
Health & Kinesiology
MS, Texas A&M University, 1981

Martin, Steven E, Clinical Associate Professor
Health & Kinesiology
PhD, Texas A&M University, 2008

Massett, Michael P, Associate Professor
Health & Kinesiology
PhD, University of Illinois at Urbana-Champaign, 1997

McBride, Ron E, Professor
Health & Kinesiology
EDD, Stanford University, 1981

McNeill, Elisa H, Clinical Associate Professor
Health & Kinesiology
PhD, Texas A&M University, 2010

Miller, Paula J, Clinical Professor
Health & Kinesiology
PhD, Texas A&M University, 1993

Milstein, Sloane H, Clinical Assistant Professor
Health & Kinesiology
EDD, Southern Connecticut State University, 2013

Muckleroy, Martha L, Instructional Professor
Health & Kinesiology
MEd, Texas A&M University, 1994

Netherland, Beth M, Instructional Associate Professor
Health & Kinesiology
MS, Miami University, 2000

Pittman, Andrew T, Clinical Associate Professor
Health & Kinesiology
PhD, Texas A&M University, 1991
Pooley, Alexandra, Instructional Assistant Professor  
Health & Kinesiology  
MS, The City University London (Trinity Laban Conservatoire of Dance and Music), 2011

Rahn, Rhonda N, Clinical Assistant Professor  
Health & Kinesiology  
PhD, Texas A&M University, 2014

Riechman, Steven E, Associate Professor  
Health & Kinesiology  
PhD, University of Pittsburgh, 2000

Salaga, Steven H, Associate Professor  
Health & Kinesiology  
PhD, University of Michigan, 2012

Sandlin, Michael E, Clinical Associate Professor  
Health & Kinesiology  
PhD, Texas A&M University, 1992

Schakel, David J, Instructional Assistant Professor  
Health & Kinesiology  
MS, Ball State University, 1978

Schmitz, Rose A, Instructional Associate Professor  
Health & Kinesiology  
MS, Texas A&M University, 1986

Shea, Charles H, Professor  
Health & Kinesiology  
PhD, Virginia Polytechnic Institute and State University, 1978

Sherman, Ledric D, Clinical Assistant Professor  
Health & Kinesiology  
PhD, Texas A&M University, 2013

Shipley, Meagan M, Clinical Assistant Professor  
Health & Kinesiology  
PhD, Indiana University, 2014

Singer, John N, Associate Professor  
Health & Kinesiology  
PhD, Ohio State University, 2002

Slagel, Kristin N, Instructional Assistant Professor  
Health & Kinesiology  
MS, Texas A&M University, 2002

Sparvero, Emily S, Adjunct Assistant Professor  
Health & Kinesiology  
PhD, University of Texas, Austin, 2008

Strong, Michelle R, Instructional Assistant Professor  
Health & Kinesiology  
MFA, Case Western Reserve University, 2011

Terral, Michael H, Lecturer  
Health & Kinesiology  
MS, Sam Houston State University, 1973

Thomas, Francis E, Instructional Professor  
Health & Kinesiology  
MS, Texas A&M University, 1980

Thornton, John H, Executive Professor  
Health & Kinesiology  
PhD, Texas A&M University, 1997

Thornton, Michael A, Clinical Assistant Professor  
Health & Kinesiology  
EDD, Texas A&M University, 2007

Tisone, Christine, Clinical Assistant Professor  
Health & Kinesiology  
PhD, Indiana University, 2004

Tyson, Laura G, Instructional Associate Professor  
Health & Kinesiology  
MEd, Texas A&M University, 2009

Wagner, Susan A, Clinical Associate Professor  
Health & Kinesiology  
PhD, Texas A&M University, 2008

Waite, Lucy J, Instructional Assistant Professor  
Health & Kinesiology  
MS, Texas A&M University, 2008

Walker, Dillon K, Research Assistant Professor  
Health & Kinesiology  
BS, Texas A&M University, 2002

Walker, Matthew B, Associate Professor  
Health & Kinesiology  
PhD, Florida State University, 2007

Waltemyer, David S, Clinical Assistant Professor  
Health & Kinesiology  
PhD, Texas A&M University, 2006

Ward, Susan E, Clinical Associate Professor  
Health & Kinesiology  
PhD, University of Virginia, 1990

Wenzel, Theresa M, Instructional Associate Professor  
Health & Kinesiology  
MED, Baylor University, 1992

Wilson, Kelly L, Associate Professor  
Health & Kinesiology  
PhD, Texas A&M University, 2004

Woodman, Christopher R, Associate Professor  
Health & Kinesiology  
PhD, University of Arizona, The, 1995

Woosley, James R, Instructional Professor  
Health & Kinesiology  
MS, Western Illinois University, 1974

Wright, David L, Professor  
Health & Kinesiology  
PhD, Pennsylvania State University, 1989

Wright, Scott, Instructional Assistant Professor  
Health & Kinesiology  
MA, University of Texas, Pan American, 1997
Majors
Health
- Bachelor of Science in Community Health (p. 264)
- Bachelor of Science in Health, Allied Health Track (p. 265)
- Bachelor of Science in Health, School Health Track (p. 266)

Kinesiology
- Bachelor of Science in Kinesiology, All-Level Physical Education Teacher Certification Track (p. 268)
- Bachelor of Science in Kinesiology, Dance Science Track (p. 269)
- Bachelor of Science in Kinesiology, Exercise Science Track, Applied Exercise Physiology Concentration (p. 270)
- Bachelor of Science in Kinesiology, Exercise Science Track, Basic Exercise Physiology Concentration (p. 271)
- Bachelor of Science in Kinesiology, Exercise Science Track, Motor Behavior Concentration (p. 272)

Sports Management
- Bachelor of Science in Sport Management, Internship Track (p. 274)
- Bachelor of Science in Sport Management, Non-Internship Track (p. 275)

University Studies
- Bachelor of Science in University Studies, Dance Concentration (p. 276)
- Bachelor of Science in University Studies, Sport Conditioning Concentration (p. 277)
- Bachelor of Science in University Studies, Sport Leadership Concentration (p. 278)

Minors
- Coaching Minor (p. 279)
- Dance Minor (p. 280)
- Sports Management Minor (p. 280)

Community Health - BS
The Bachelor of Science in Community Health prepares and educates students to serve as community health educators and promoters in a variety of government and private health agencies, clinical settings, nonprofit organizations, volunteer agencies and other community organizations. This program is unique in that it offers a wide range of approved electives permitting the student to develop a program according to his or her needs and interests. Each graduate will have knowledge enabling them to communicate health and health education needs, concerns and resources.

In addition to classroom experience, the student is exposed to pre-professional training through a non-paid, full semester internship in the final semester. This internship program provides them with on-the-job experience and employment opportunities. Students are placed in a setting which best fits their professional goals.

Program Requirements
This degree plan has been laid out showing students the number of hours they must take each semester in order to complete the degree in four years without attending summer school. This is a suggested plan and does not have to be followed as laid out below. Students should use this information in conjunction with advising documents available from their advisor or the department website when scheduling courses each semester to ensure they are meeting all prerequisites, taking courses for admission to professional phase in a timely manner and meeting all grade requirements.

First Year
Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENGL 103 or ENGL 104</td>
<td>3</td>
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<tr>
<td>Select one of the following:</td>
<td>3-4</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Business Mathematics I</td>
</tr>
<tr>
<td>MATH 148</td>
<td>Calculus II for Biological Sciences</td>
</tr>
<tr>
<td>MATH 152</td>
<td>Engineering Mathematics II</td>
</tr>
<tr>
<td>MATH 166</td>
<td>Topics in Contemporary Mathematics II</td>
</tr>
<tr>
<td>MATH 172</td>
<td>Calculus</td>
</tr>
<tr>
<td>BIOL 107</td>
<td>Zoology</td>
</tr>
<tr>
<td>American history elective (p. 23)</td>
<td>3</td>
</tr>
<tr>
<td>Creative arts elective (p. 22)</td>
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</table>

Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>Select one of the following:</td>
<td>3-4</td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
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<tr>
<td>COMM 205</td>
<td>Communication for Technical Professions</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td>3-4</td>
</tr>
<tr>
<td>MATH 131</td>
<td>Mathematical Concepts—Calculus</td>
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<tr>
<td>MATH 142</td>
<td>Business Mathematics II</td>
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<td>MATH 147</td>
<td>Calculus I for Biological Sciences</td>
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<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
</tr>
<tr>
<td>MATH 171</td>
<td>Analytic Geometry and Calculus</td>
</tr>
<tr>
<td>PHIL 240</td>
<td>Introduction to Logic</td>
</tr>
<tr>
<td>CHEM 101 &amp; CHEM 111</td>
<td>Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory I</td>
</tr>
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<td>American history elective (p. 23)</td>
<td>3</td>
</tr>
<tr>
<td>HLTH 210</td>
<td>Introduction to the Discipline</td>
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</table>

Second Year
Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOL 319</td>
<td>Integrated Human Anatomy and Physiology I</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
</tr>
</tbody>
</table>
### Health - BS, Allied Health Track

The goals of the curriculum leading to a Bachelor of Science in Health are to more effectively develop literate, informed professionals capable of making the world healthier and more humane. Students receive a general education through a broad exposure to information. They also receive a specialized education through coursework designed to help them develop as a professional, expand their knowledge and skills related to health education and prepare them for professional practice. The curriculum in health offers two options: the Allied Health track and the School Health track.

The Allied Health concentration gives students a strong background in health that serves them well if they choose to pursue additional schooling in an allied health area. This concentration provides an opportunity for students to take prerequisite courses for professional allied health schools as electives while receiving a background in the health education field. Students select electives from a list of prerequisites for specific professional schools.

This program consists of two phases: pre-professional phase and professional phase. Students must meet program prerequisite requirements in order to advance to professional phase.

### Program Requirements

This degree plan has been laid out showing students the number of hours they must take each semester in order to complete the degree in four years without attending summer school. This is a suggested plan and does not have to be followed as laid out below. Students should use this information in conjunction with advising documents available from their advisor or the department website when scheduling courses each semester to ensure they are meeting all prerequisites, taking courses for admission to professional phase in a timely manner and meeting all grade requirements.

#### First Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ENGL 103 or ENGL 104</td>
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<td>COMM 203</td>
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<td>COMM 205</td>
<td>3</td>
</tr>
<tr>
<td>HLTH 216</td>
<td>2</td>
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<tr>
<td>Language, philosophy and culture elective (p. 21)</td>
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<td>POLS 207</td>
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#### Term Semester Credit Hours: 15

#### Spring

<table>
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<th>Course</th>
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<tbody>
<tr>
<td>HLTH 231</td>
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<td>KINE 120</td>
<td>1</td>
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<tr>
<td>KINE 199</td>
<td>1</td>
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#### Third Year

<table>
<thead>
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<th>Fall Semester</th>
<th>Credit Hours</th>
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<td>HLTH 236</td>
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<tr>
<td>HLTH 331</td>
<td>3</td>
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<tr>
<td>Health Elective</td>
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<td>Health Elective</td>
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<tr>
<td>Free Elective</td>
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</tbody>
</table>

#### Term Semester Credit Hours: 15

#### Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>HLTH 335</td>
<td>3</td>
</tr>
<tr>
<td>HLTH 342</td>
<td>3</td>
</tr>
<tr>
<td>Health Elective</td>
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</tr>
<tr>
<td>Health Elective</td>
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<tr>
<td>Free Elective</td>
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#### Fourth Year

<table>
<thead>
<tr>
<th>Fall Semester</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLTH 353</td>
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<tr>
<td>HLTH 415</td>
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<td>HLTH 425</td>
<td>3</td>
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<td>HLTH 440</td>
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<tr>
<td>Interns</td>
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</tr>
<tr>
<td>HLTH 482</td>
<td>1</td>
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<tr>
<td>Free Elective</td>
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</table>

#### Term Semester Credit Hours: 16

#### Spring

<table>
<thead>
<tr>
<th>Course</th>
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</thead>
<tbody>
<tr>
<td>HLTH 484</td>
<td>12</td>
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</table>

#### Term Semester Credit Hours: 12

### Total Semester Credit Hours: 120

1. Course should meet Core Curriculum requirement.
2. Course selection should meet the International and Cultural Diversity Graduation requirement, if needed.
3. Course meets International and Cultural Diversity graduation requirement.
4. To be chosen in consultation with academic advisor.
5. Course meets the University writing requirement.
Select one of the following: 3-4

- MATH 131 Mathematical Concepts—Calculus
- MATH 142 Business Mathematics II
- MATH 147 Calculus I for Biological Sciences
- MATH 151 Engineering Mathematics I
- MATH 171 Analytic Geometry and Calculus
- PHIL 240 Introduction to Logic
- CHEM 101 Fundamentals of Chemistry I
- CHEM 111 and Fundamentals of Chemistry Laboratory

American history elective (p. 23) 1,2

HLTH 210 Introduction to the Discipline 3

| Term Semester Credit Hours | 16 |

Second Year

Fall

- BIOL 319 Integrated Human Anatomy and Physiology II 4
- KINE 120 The Science of Basic Health and Fitness 1
- POLS 206 American National Government 3
- PSYC 107 Introduction to Psychology 3
- HLTH 231 Healthy Lifestyles 3
- KINE 199 Required Physical Activity 1

| Term Semester Credit Hours | 15 |

Spring

- BIOL 320 Integrated Human Anatomy and Physiology II 4
- HLTH 216 First Aid 2
- HLTH 240/KINE 240 Computer Technology in Health and Kinesiology 3
- POLS 207 State and Local Government 3
- Language, philosophy and culture elective (p. 21) 1,2

| Term Semester Credit Hours | 15 |

Third Year

Fall

- HLTH 236 Race, Ethnicity and Health 3
- HLTH 331 Community Health 3
- HLTH 342 Human Sexuality 3
- HLTH 481 Seminar in Allied Health 4
- SOCI 205 Introduction to Sociology 3
- Free Elective 3

| Term Semester Credit Hours | 16 |

Spring

- HLTH 335 Human Diseases 3
- HLTH 354 Medical Terminology for the Health Professions 3
- HLTH 407 Global Health 3

Select one of the following:

- STAT 301 Introduction to Biometry 3
- STAT 302 Statistical Methods 3
- STAT 303 Statistical Methods 3

| Term Semester Credit Hours | 15 |

Fourth Year

Fall

- HLTH 353 Drugs and Society 3
- HLTH 403 Consumer Health 3
- HLTH 482 Grant Writing in Health 4

Professional Development Elective 5

| Term Semester Credit Hours | 13 |

Spring

- HLTH 410 Exercise and Health Programs in the Workplace 3
- HLTH 429 Environmental Health 3
- HLTH 445 Professional Practice in Health Education 2

Professional Development Elective 5

| Term Semester Credit Hours | 14 |

Total Semester Credit Hours: 120

1. Must meet Core Curriculum requirements.
2. Course selection should meet the International and Cultural Diversity graduation requirement, if needed.
3. Course meets International and Cultural Diversity graduation requirement.
5. To be chosen in consultation with your academic advisor.

Health - BS, School Health Track

The goals of the curriculum leading to a Bachelor of Science in Health are to more effectively develop literate, informed professionals capable of making the world healthier and more humane. Students receive a general education through a broad exposure to information. They also receive a specialized education through coursework designed to help them develop as a professional, expand their knowledge and skills related to health education and prepare them for professional practice. The curriculum in health offers two options: the Allied Health track and the School Health track.

The School Health option provides a background in the basic health sciences and pedagogy and prepares educators to plan, implement and evaluate health education in a variety of settings with an emphasis on teaching health in school settings. Graduates have the ability to acquire K-12 teacher certification credentials enabling them to teach health only in public or private schools although students are encouraged to become certified in a support teaching field through the use of core curriculum and support field electives. Students frequently take support field electives that also serve as course pre-requisites for professional schools such as nursing, PA, PT or other medical fields of study. Each student completes appropriate course work in academic foundations and professional education as well as participates in several field experiences representing a variety of levels and types of instruction. The program consists of three phases in the development of their professional dispositions. All students will complete a full semester of student teaching in a school setting as a culminating experience.

Program Requirements
This degree plan has been laid out showing students the number of hours they must take each semester in order to complete the degree in four years without attending summer school. This is a suggested plan and does not have to be followed as laid out below. Students should use this information in conjunction with advising documents available from their advisor or the department website when scheduling courses each semester to ensure they are meeting all prerequisites, taking courses for admission to professional phase in a timely manner and meeting all grade requirements.

<table>
<thead>
<tr>
<th>First Year</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
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<tr>
<td>ENGL 103 or ENGL 104</td>
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</tr>
<tr>
<td>Select one of the following:</td>
<td>3-4</td>
</tr>
<tr>
<td>MATH 141</td>
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<td>Calculus II for Biological Sciences</td>
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<tr>
<td>MATH 152</td>
<td>Engineering Mathematics II</td>
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<tr>
<td>MATH 166</td>
<td>Topics in Contemporary Mathematics II</td>
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<td>MATH 172</td>
<td>Calculus</td>
</tr>
<tr>
<td>BIOL 107</td>
<td>Zoology</td>
</tr>
<tr>
<td>HLTH 210</td>
<td>Introduction to the Discipline</td>
</tr>
<tr>
<td>American history (p. 23)</td>
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<tr>
<td>Term Semester Credit Hours</td>
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<tr>
<td>Spring</td>
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</tr>
<tr>
<td>Select one of the following:</td>
<td>3-4</td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
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<td>COMM 205</td>
<td>Communication for Technical Professions</td>
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<tr>
<td>Select one of the following:</td>
<td>3-4</td>
</tr>
<tr>
<td>MATH 131</td>
<td>Mathematical Concepts—Calculus</td>
</tr>
<tr>
<td>MATH 142</td>
<td>Business Mathematics II</td>
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<td>MATH 147</td>
<td>Calculus I for Biological Sciences</td>
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<td>MATH 151</td>
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<td>PHIL 240</td>
<td>Introduction to Logic</td>
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<td>CHEM 101 &amp; CHEM 111</td>
<td>Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory I</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
</tr>
<tr>
<td>American history (p. 23)</td>
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</tr>
<tr>
<td>Term Semester Credit Hours</td>
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</tr>
<tr>
<td>Second Year</td>
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</tr>
<tr>
<td>Fall</td>
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</tr>
<tr>
<td>HEFB 222/KNFB</td>
<td>Teaching and Schooling in Modern Society 222</td>
</tr>
<tr>
<td>HLTH 231</td>
<td>Healthy Lifestyles</td>
</tr>
<tr>
<td>KINE 120</td>
<td>The Science of Basic Health and Fitness</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
</tr>
<tr>
<td>Language, philosophy and culture (p. 21)</td>
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</tr>
<tr>
<td>Support field elective</td>
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</tr>
<tr>
<td>Term Semester Credit Hours</td>
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</tr>
<tr>
<td>Spring</td>
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</table>

<table>
<thead>
<tr>
<th>Third Year</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>BIOL 320</td>
<td>Integrated Human Anatomy and Physiology II</td>
</tr>
<tr>
<td>HEFB 324</td>
<td>Technology and Teaching Skills for the 21st Century Learner</td>
</tr>
<tr>
<td>HLTH 216</td>
<td>First Aid</td>
</tr>
<tr>
<td>KINE 429</td>
<td>Adapted Physical Activity</td>
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<tr>
<td>PSYC 307</td>
<td>Developmental Psychology</td>
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<td>Health elective</td>
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<td>Term Semester Credit Hours</td>
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<tr>
<td>Spring</td>
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</tr>
<tr>
<td>HEFB 325/KNFB</td>
<td>Introduction to Secondary School Teaching 325</td>
</tr>
<tr>
<td>HLTH 332</td>
<td>School Health Program</td>
</tr>
<tr>
<td>HLTH 353</td>
<td>Drugs and Society</td>
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<tr>
<td>KINE 425</td>
<td>Tests and Measurements</td>
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<td>Term Semester Credit Hours</td>
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<tr>
<td>Fourth Year</td>
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<td>Fall</td>
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</tr>
<tr>
<td>HLTH 335</td>
<td>Human Diseases</td>
</tr>
<tr>
<td>HLTH 342</td>
<td>Human Sexuality</td>
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<tr>
<td>HLTH 415</td>
<td>Health Education Methodology</td>
</tr>
<tr>
<td>HLTH 421</td>
<td>Elementary School Health Instruction</td>
</tr>
<tr>
<td>HLTH 482</td>
<td>Grant Writing in Health</td>
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<tr>
<td>Health elective</td>
<td>3</td>
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<tr>
<td>Term Semester Credit Hours</td>
<td>15</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td>HEFB 450/KNFB</td>
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<td>Term Semester Credit Hours</td>
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</tr>
<tr>
<td>Total Semester Credit Hours:</td>
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</tr>
</tbody>
</table>

1 Course selection should meet the International and Cultural Diversity (p. 34) graduation requirement.  
2 To be chosen in consultation with academic advisor.  
3 Meets the University writing requirement.
Kinesiology - BS, All-Level
Physical Education Teacher Certification Track

The Bachelor of Science degree in Kinesiology offers several options designed to prepare students for a variety of careers in public school education, exercise science and dance science. Some options also provide academic preparation for students interested in professional schools, e.g., physical therapy, occupational therapy, physician’s assistant or medicine. There are some common course requirements for all kinesiology options. Additional hours for each option are specifically designed to prepare students for that field of study. The sequencing of courses should be determined in consultation with an appropriate academic advisor.

This option is offered to students wishing to teach physical education in public or private school. The all-level certification qualifies the recipient to teach in preschool–12th grades in physical education/wellness only. This degree plan includes a full semester of student teaching in a public school setting after the completion of coursework. This degree plan will provide a program that will lead to successful completion of the certification requirements outlined by the State of Texas. Additional program information is available on the Department of Health and Kinesiology website or by contacting the advising office in the department.

Program Requirements

This degree plan has been laid out showing students the number of hours they must take each semester in order to complete the degree in four years without attending summer school. This is a suggested plan and does not have to be followed as laid out below. Students should use this information in conjunction with advising documents available from their advisor or the department website when scheduling courses each semester to ensure they are meeting all prerequisites, taking courses for admission to professional phase in a timely manner and meeting all grade requirements.

First Year

Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BIOL 107 Zoology</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 103 or 104</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td>3-4</td>
</tr>
<tr>
<td>MATH 141 Business Mathematics I</td>
<td></td>
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<tr>
<td>MATH 148 Calculus II for Biological Sciences</td>
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<tr>
<td>MATH 152 Engineering Mathematics II</td>
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</tr>
<tr>
<td>MATH 166 Topics in Contemporary Mathematics II</td>
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</tr>
<tr>
<td>MATH 172 Calculus</td>
<td></td>
</tr>
<tr>
<td>KINE 199 Required Physical Activity</td>
<td>1</td>
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<tr>
<td>American history elective (p. 23)</td>
<td>3</td>
</tr>
<tr>
<td>Language, philosophy and culture elective (p. 21)</td>
<td>3</td>
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Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOL 319 Integrated Human Anatomy and Physiology I</td>
<td>4</td>
</tr>
<tr>
<td>POLS 207 State and Local Government</td>
<td>3</td>
</tr>
<tr>
<td>KINE 120 The Science of Basic Health and Fitness</td>
<td>1</td>
</tr>
<tr>
<td>KINE 311 Fundamental Rhythms and Dance</td>
<td>3</td>
</tr>
<tr>
<td>Support Field Electives</td>
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Second Year

Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>BIOL 320 Integrated Human Anatomy and Physiology II</td>
<td>4</td>
</tr>
<tr>
<td>KINE 307 Lifespan Motor Development</td>
<td>3</td>
</tr>
<tr>
<td>KINE 425 Tests and Measurements</td>
<td>3</td>
</tr>
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<td>KINE 429 Adapted Physical Activity</td>
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<td>Support Field Electives</td>
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Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>PSYC 307 Developmental Psychology</td>
<td>3</td>
</tr>
<tr>
<td>KNFB 315 Elementary School Physical Activities</td>
<td>3</td>
</tr>
<tr>
<td>KNFB 324 Technology and Teaching Skills for the 21st Century Learner</td>
<td>3</td>
</tr>
<tr>
<td>KNFB 325/HEFB 325 Introduction to Secondary School Teaching</td>
<td>3</td>
</tr>
<tr>
<td>KINE 199 Required Physical Activity</td>
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</tbody>
</table>
KINE 318  Athletic Injuries  3

**Term Semester Credit Hours**  16

### Fourth Year

#### Fall
- HLTH 421  Elementary School Health Instruction  3
- KINE 308  Integrated Adventure Education  3
- KINE 426  Exercise Biomechanics  4
- KINE 433  Physiology of Exercise  3
- KNFB 416  Middle and Secondary School Physical Education  6

#### Spring
- KNFB 450  Supervised Student Teaching  6

**Term Semester Credit Hours**  16

Total Semester Credit Hours:  120

1. Course selection should meet the International and Cultural Diversity graduation requirement if needed.
2. Must meet Core Curriculum requirements.
3. Participation in band or athletics cannot be used for KINE 199 credit. KINE 199 activities cannot be repeated for credit and must be taken for a grade. Must be a majors section.
4. To be chosen in consultation with your academic advisor.
5. Meets Creative Arts core curriculum requirement.

**Kinesiology - BS, Dance Science Track**

The Bachelor of Science degree in Kinesiology offers several options designed to prepare students for a variety of careers in public school education, exercise science and dance science. Some options also provide academic preparation for students interested in professional schools, e.g., physical therapy, occupational therapy, physician’s assistant or medicine. There are some common course requirements for all kinesiology options. Additional hours for each option are specifically designed to prepare students for that field of study. The sequencing of courses should be determined in consultation with an appropriate academic advisor.

This option is offered to prepare and educate students to enter the field of dance science. Dance Scientists are professionals who are employed by dance companies and dance training facilities throughout the world to devise effective training programs as well as advise the dancers regarding nutrition, injury prevention/care and dance psychology. Dance Scientists also become researchers, dance therapists, massage therapists and better informed dancers and teachers.

**Program Requirements**

This degree plan has been laid out showing students the number of hours they must take each semester in order to complete the degree in four years without attending summer school. This is a suggested plan and does not have to be followed as laid out below. Students should use this information in conjunction with advising documents available from their advisor or the department website when scheduling courses each semester to ensure they are meeting all prerequisites, taking courses for admission to professional phase in a timely manner and meeting all grade requirements.

### First Year

#### Fall
- ENGL 103 or ENGL 104  Introduction to Rhetoric and Composition or Composition and Rhetoric  3
- Select one of the following:  3-4
  - MATH 142  Business Mathematics I
  - MATH 147  Calculus I for Biological Sciences
  - MATH 151  Engineering Mathematics I
  - MATH 171  Analytic Geometry and Calculus
- KINE 213  Foundations of Kinesiology  3
- KINE 260  Movement Lab: Ballet I  2
- KINE 271  Movement Lab: Modern Dance I  2
- KINE 199  Required Physical Activity  3

**Term Semester Credit Hours**  17

#### Spring
- Select one of the following:  3
  - ENGL 203  Writing about Literature
  - ENGL 210  Technical and Business Writing
  - ENGL 235  Elements of Creative Writing
  - COMM 203  Public Speaking
  - COMM 205  Communication for Technical Professions
  - COMM 243  Argumentation and Debate
- Select one of the following:  3-4
  - MATH 131  Mathematical Concepts—Calculus
  - MATH 143  Business Mathematics II
  - MATH 148  Calculus II for Biological Sciences
  - MATH 152  Engineering Mathematics II
  - MATH 166  Topics in Contemporary Mathematics II
  - MATH 172  Calculus
  - BIOL 107  Zoology  4
  - DCED 160  Ballet I  2
  - DCED 171  Modern Dance I  2
  - PSYC 107  Introduction to Psychology  3

**Term Semester Credit Hours**  17

### Second Year

#### Fall
- PHYS 201  College Physics  4
- DCED 161  Ballet II  2
- DCED 172  Modern Dance II  2
- KINE 201  Pilates Apparatus  2
- DCED 303  Health Practices for Dancers  2

American history elective (p. 23)  3

**Term Semester Credit Hours**  17

#### Spring
- BIOL 319  Integrated Human Anatomy and Physiology  4
- POLS 206  American National Government  3

American history elective (p. 23)  3

**Term Semester Credit Hours**  15
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>DCED 203</td>
<td>Dance Production</td>
<td>3</td>
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<tr>
<td>KINE 361</td>
<td>Movement Lab: Ballet II</td>
<td>2</td>
</tr>
<tr>
<td>KINE 372</td>
<td>Movement Lab: Modern Dance II</td>
<td>2</td>
</tr>
<tr>
<td>KINE 175 or</td>
<td>Gender Neutral Partnering or Required</td>
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<tr>
<td>KINE 199</td>
<td>Physical Activity 3</td>
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### Term Semester Credit Hours

15

### Third Year

#### Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIOL 320</td>
<td>Integrated Human Anatomy and Physiology II</td>
<td>4</td>
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<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
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<tr>
<td>DCED 162</td>
<td>Ballet III</td>
<td>2</td>
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<tr>
<td>DCED 173</td>
<td>Modern Dance III</td>
<td>2</td>
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<tr>
<td>NUTR 202</td>
<td>Fundamentals of Human Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>DCED 306</td>
<td>Dance Composition I</td>
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### Term Semester Credit Hours

16

#### Spring

<table>
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<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>DCED 301</td>
<td>Dance History 4</td>
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<tr>
<td>DCED 400</td>
<td>Dance Composition II</td>
<td>3</td>
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<tr>
<td>KINE 305</td>
<td>Sport Nutrition</td>
<td>3</td>
</tr>
<tr>
<td>KINE 318</td>
<td>Athletic Injuries</td>
<td>3</td>
</tr>
<tr>
<td>KINE 462</td>
<td>Movement Lab: Ballet III</td>
<td>2</td>
</tr>
<tr>
<td>KINE 473</td>
<td>Movement Lab: Modern Dance III</td>
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### Term Semester Credit Hours

15

### Fourth Year

#### Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>KINE 406</td>
<td>Motor Learning and Skill Performance</td>
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<tr>
<td>SPMT 304</td>
<td>Sport Psychology Management and Practice</td>
<td>3</td>
</tr>
<tr>
<td>DCED 402</td>
<td>Dance Composition III</td>
<td>2</td>
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<tr>
<td>KINE 482</td>
<td>Seminar 4</td>
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<td></td>
<td>Language, philosophy and culture elective (p. 21)</td>
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### Term Semester Credit Hours

12

#### Spring

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>DCED 202</td>
<td>Dance Appreciation 5</td>
<td>3</td>
</tr>
<tr>
<td>DCED 401</td>
<td>Dance Pedagogy</td>
<td>3</td>
</tr>
<tr>
<td>KINE 120</td>
<td>The Science of Basic Health and Fitness</td>
<td>1</td>
</tr>
<tr>
<td>KINE 403</td>
<td>Dance Wellness</td>
<td>3</td>
</tr>
<tr>
<td>KINE 433</td>
<td>Physiology of Exercise</td>
<td>3</td>
</tr>
</tbody>
</table>

### Term Semester Credit Hours

13

### Total Semester Credit Hours

120

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1. Course selection should meet the International and Cultural Diversity Graduation requirement if needed.
2. Must meet Core Curriculum requirements.
3. To be chosen in consultation with your academic advisor. Students must take a specific activity.
4. Meets the University writing requirement.
5. Meets Creative Arts core curriculum requirement.

---

### Kinesiology - BS, Exercise Science Track, Applied Exercise Physiology Concentration

The Bachelor of Science degree in Kinesiology offers several options designed to prepare students for a variety of careers in public school education, exercise science and dance science. Some options also provide academic preparation for students interested in professional schools, e.g., physical therapy, occupational therapy, physician’s assistant or medicine. There are some common course requirements for all kinesiology options. Additional hours for each option are specifically designed to prepare students for that field of study. The sequencing of courses should be determined in consultation with an appropriate academic advisor.

The three options in exercise science expose students to a strong science background making them excellent candidates for employment opportunities in exercise related areas (cardiac rehabilitation, corporate or private fitness), advanced graduate studies (motor behavior, exercise physiology) or professional school (medical, dental or physical therapy). Course prerequisites for medical, dental or physical therapy professional schools are included in the various programs under this track.

### Program Requirements

This degree plan has been laid out showing students the number of hours they must take each semester in order to complete the degree in four years without attending summer school. This is a suggested plan and does not have to be followed as laid out below. Students should use this information in conjunction with advising documents available from their advisor or the department website when scheduling courses each semester to ensure they are meeting all prerequisites, taking courses for admission to professional phase in a timely manner and meeting all grade requirements.

#### First Year

##### Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104 or</td>
<td>Composition and Rhetoric or Introduction to</td>
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</tr>
<tr>
<td>ENGL 103</td>
<td>Rhetoric and Composition</td>
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</tr>
<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Select one of the following:</td>
<td>3-4</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Business Mathematics I</td>
<td></td>
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<tr>
<td>MATH 148</td>
<td>Calculus II for Biological Sciences</td>
<td></td>
</tr>
<tr>
<td>MATH 152</td>
<td>Engineering Mathematics II</td>
<td></td>
</tr>
<tr>
<td>MATH 166</td>
<td>Topics in Contemporary Mathematics II</td>
<td></td>
</tr>
<tr>
<td>MATH 172</td>
<td>Calculus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Creative arts elective (p. 22) 5</td>
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</table>

### Term Semester Credit Hours

17

#### Spring

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 131</td>
<td>Mathematical Concepts—Calculus</td>
<td>3-4</td>
</tr>
<tr>
<td>MATH 142</td>
<td>Business Mathematics II</td>
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</table>
MATH 147  Calculus I for Biological Sciences  
MATH 151  Engineering Mathematics I  
MATH 171  Analytic Geometry and Calculus  
BIOL 112  Introductory Biology II  
CHEM 102 & CHEM 112  Fundamentals of Chemistry II and Fundamentals of Chemistry Laboratory II  
Select one of the following:  
COMM 203  Public Speaking  
COMM 205  Communication for Technical Professions  
COMM 243  Argumentation and Debate  
ENGL 210  Technical and Business Writing  
American history elective (p. 23)  

**Term Semester Credit Hours**  
17  

**Second Year**  
**Fall**  
PHYS 201  College Physics  
BIOL 319  Integrated Human Anatomy and Physiology I  
PSYC 107  Introduction to Psychology  
KINE 121  Physical and Motor Fitness Assessment  
American history elective (p. 23)  

**Term Semester Credit Hours**  
16  

**Spring**  
PHYS 202  College Physics  
BIOL 320  Integrated Human Anatomy and Physiology II  
POLS 206  American National Government  
KINE 213  Foundations of Kinesiology  
Language, philosophy and culture elective (p. 21)  

**Term Semester Credit Hours**  
17  

**Third Year**  
**Fall**  
POLS 207  State and Local Government  
STAT 302 or STAT 303  Statistical Methods or Statistical Methods  
KINE 433  Physiology of Exercise  
KINE 426  Exercise Biomechanics  
KINE 198  Health and Fitness Activity  
KINE 199  Required Physical Activity  

**Term Semester Credit Hours**  
15  

**Spring**  
HLTH 335  Human Diseases  
KINE 318  Athletic Injuries  
KINE 439  Exercise Evaluation and Prescription  
KINE 199  Required Physical Activity  
Professional Development Elective  

**Term Semester Credit Hours**  
14  

**Fourth Year**  
**Fall**  
KINE 427  Therapeutic Principles  
KINE 483  Practicum in Kinesiology  
Professional Development Elective  
Professional Development Elective  
Professional Development Elective  

**Term Semester Credit Hours**  
15  

Total Semester Credit Hours:  
120  

1 Course selection should meet the International and Cultural Diversity Graduation requirement, if needed.  
2 To be chosen in consultation with your academic advisor.  
3 Must meet Core Curriculum requirements.  
4 Participation in band or athletics cannot be used for KINE 199 credit. KINE 199 activities cannot be repeated for credit and must be taken for a grade.  
5 Meets Core Curriculum writing requirement. Select writing intensive section of KINE 198.  

**Kinesiology - BS, Exercise Science Track, Basic Exercise Physiology Concentration**  

The Bachelor of Science degree in Kinesiology offers several options designed to prepare students for a variety of careers in public school education, exercise science and dance science. Some options also provide academic preparation for students interested in professional schools, e.g., physical therapy, occupational therapy, physician's assistant or medicine. There are some common course requirements for all kinesiology options. Additional hours for each option are specifically designed to prepare students for that field of study. The sequencing of courses should be determined in consultation with an appropriate academic advisor. The three options in exercise science expose students to a strong science background making them excellent candidates for employment opportunities in exercise related areas (cardiac rehabilitation, corporate or private fitness), advanced graduate studies (motor behavior, exercise physiology) or professional school (medical, dental or physical therapy). Course prerequisites for medical, dental or physical therapy professional schools are included in the various programs under this track.  

**Program Requirements**  

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### First Year

#### Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 103 or ENGL 104</td>
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<tr>
<td>Select from the following:</td>
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<tr>
<td>MATH 141 Business Mathematics I</td>
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<td>MATH 148 Calculus II for Biological Sciences</td>
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<tr>
<td>MATH 152 Engineering Mathematics II</td>
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<td>MATH 166 Topics in Contemporary Mathematics II</td>
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<tr>
<td>MATH 172 Calculus</td>
<td></td>
</tr>
<tr>
<td>BIOL 111 Introductory Biology I</td>
<td>4</td>
</tr>
<tr>
<td>American history elective (p. 23)</td>
<td>3</td>
</tr>
<tr>
<td>Creative arts elective (p. 22)</td>
<td>3</td>
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</tbody>
</table>

**Term Semester Credit Hours** 16

#### Spring

Select one of the following: 3

- COMM 203 Public Speaking
- COMM 205 Communication for Technical Professions
- COMM 243 Argumentation and Debate
- ENGL 210 Technical and Business Writing

Select one of the following: 3-4

- MATH 131 Mathematical Concepts—Calculus
- MATH 142 Business Mathematics II
- MATH 147 Calculus I for Biological Sciences
- MATH 151 Engineering Mathematics I
- MATH 171 Analytic Geometry and Calculus
- BIOL 112 Introductory Biology II
- KINE 121 Physical and Motor Fitness Assessment

**Term Semester Credit Hours** 15

### Second Year

#### Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 101 &amp; CHEM 111</td>
<td>4</td>
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<tr>
<td>PHYS 201 College Physics</td>
<td></td>
</tr>
<tr>
<td>PSYC 107 Introduction to Psychology</td>
<td>3</td>
</tr>
<tr>
<td>POLS 206 American National Government</td>
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**Term Semester Credit Hours** 14

#### Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CHEM 102 &amp; CHEM 112</td>
<td>4</td>
</tr>
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<td>PHYS 202 College Physics</td>
<td></td>
</tr>
<tr>
<td>POLS 207 State and Local Government</td>
<td>3</td>
</tr>
<tr>
<td>KINE 213 Foundations of Kinesiology</td>
<td>3</td>
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<tr>
<td>Language, philosophy and culture (p. 21)</td>
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**Term Semester Credit Hours** 17

### Third Year

#### Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>BIOL 319 Integrated Human Anatomy and Physiology I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 227 &amp; CHEM 237 Organic Chemistry I and Organic Chemistry Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 351 Fundamentals of Microbiology</td>
<td>4</td>
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<tr>
<td>KINE 198 Health and Fitness Activity</td>
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<tr>
<td>STAT 302 or STAT 303 Statistical Methods or Statistical Methods</td>
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**Term Semester Credit Hours** 16

#### Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>BIOL 320 Integrated Human Anatomy and Physiology II</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 228 &amp; CHEM 238 Organic Chemistry II and Organic Chemistry Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>KINE 318 Athletic Injuries</td>
<td>3</td>
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<td>KINE 199 Required Physical Activity</td>
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**Term Semester Credit Hours** 15

### Fourth Year

#### Fall

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<tr>
<td>BICH 410 Comprehensive Biochemistry I</td>
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<tr>
<td>KINE 406 Motor Learning and Skill Performance</td>
<td>3</td>
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<tr>
<td>KINE 427 Therapeutic Principles</td>
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**Term Semester Credit Hours** 14

#### Spring

<table>
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<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENE 301 &amp; GENE 312 Comprehensive Genetics and Comprehensive Genetics Laboratory</td>
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</tr>
<tr>
<td>KINE 433 Physiology of Exercise</td>
<td>3</td>
</tr>
<tr>
<td>KINE 426 Exercise Biomechanics</td>
<td>4</td>
</tr>
<tr>
<td>KINE 482 Seminar 3</td>
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<tr>
<td>KINE 199 Required Physical Activity</td>
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</table>

**Term Semester Credit Hours** 13

**Total Semester Credit Hours:** 120

---

1. Course selection should meet the International and Cultural Diversity Graduation requirement, if needed.
2. Course must meet Core Curriculum requirements.
4. To be chosen in consultation with your academic advisor.
5. Participation in band or athletics cannot be used for KINE 199 credit. KINE 199 activities cannot be repeated for credit and must be taken for a grade.

### Kinesiology - BS, Exercise Science Track, Motor Behavior Concentration

The Bachelor of Science degree in Kinesiology offers several options designed to prepare students for a variety of careers in public school
education, exercise science and dance science. Some options also provide academic preparation for students interested in professional schools, e.g., physical therapy, occupational therapy, physician’s assistant or medicine. There are some common course requirements for all kinesiology options. Additional hours for each option are specifically designed to prepare students for that field of study. The sequencing of courses should be determined in consultation with an appropriate academic advisor.

The three options in exercise science expose students to a strong science background making them excellent candidates for employment opportunities in exercise related areas (cardiac rehabilitation, corporate or private fitness), advanced graduate studies (motor behavior, exercise physiology) or professional school (medical, dental or physical therapy). Course prerequisites for medical, dental or physical therapy professional schools are included in the various programs under this track.

Program Requirements

This degree plan has been laid out showing students the number of hours they must take each semester in order to complete the degree in four years without attending summer school. This is a suggested plan and does not have to be followed as laid out below. Students should use this information in conjunction with advising documents available from their advisor or the department website when scheduling courses each semester to ensure they are meeting all prerequisites, taking courses for admission to professional phase in a timely manner and meeting all grade requirements.

### First Year

#### Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 103 or ENGL 104</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Rhetoric and Composition or Composition and Rhetoric</td>
<td></td>
</tr>
<tr>
<td>MATH 141</td>
<td>3</td>
</tr>
<tr>
<td>Business Mathematics I</td>
<td></td>
</tr>
<tr>
<td>MATH 148</td>
<td>3</td>
</tr>
<tr>
<td>Calculus II for Biological Sciences</td>
<td></td>
</tr>
<tr>
<td>MATH 152</td>
<td>3</td>
</tr>
<tr>
<td>Engineering Mathematics II</td>
<td></td>
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<tr>
<td>MATH 166</td>
<td>3</td>
</tr>
<tr>
<td>Topics in Contemporary Mathematics II</td>
<td></td>
</tr>
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<td>MATH 172</td>
<td>3</td>
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<tr>
<td>Calculus</td>
<td></td>
</tr>
<tr>
<td>BIOL 111</td>
<td>4</td>
</tr>
<tr>
<td>Introductory Biology I</td>
<td></td>
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<tr>
<td>American history (p. 23)</td>
<td>3</td>
</tr>
<tr>
<td>Creative arts (p. 22)</td>
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</table>

#### Spring

Select one of the following:

- COMM 203: Public Speaking
- COMM 205: Communication for Technical Professions
- COMM 243: Argumentation and Debate
- ENGL 210: Technical and Business Writing

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<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
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</tr>
<tr>
<td>Mathematical Concepts—Calculus</td>
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</tr>
<tr>
<td>MATH 142</td>
<td>3</td>
</tr>
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<td>Business Mathematics II</td>
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<tr>
<td>MATH 147</td>
<td>3</td>
</tr>
<tr>
<td>Calculus I for Biological Sciences</td>
<td></td>
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<td>MATH 151</td>
<td>3</td>
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<td>MATH 171</td>
<td>3</td>
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<tr>
<td>Analytic Geometry and Calculus</td>
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<td>BIOL 112</td>
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<td>KINE 121</td>
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<tr>
<td>Physical and Motor Fitness Assessment</td>
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<td>American history (p. 23)</td>
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#### Term Semester Credit Hours

| Term Semester Credit Hours | 15 |

### Second Year

#### Fall

<table>
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<th>Credit Hours</th>
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<td>&amp; CHEM 111</td>
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<td>and Fundamentals of Chemistry Laboratory I</td>
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<td>PHYS 201</td>
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<td>PSYC 107</td>
<td>3</td>
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<td>Introduction to Psychology</td>
<td></td>
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<td>POLS 206</td>
<td>3</td>
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<td>American National Government</td>
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#### Term Semester Credit Hours

| Term Semester Credit Hours | 14 |

#### Spring

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<td>and Fundamentals of Chemistry Laboratory II</td>
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<td>PHYS 202</td>
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<tr>
<td>POLS 207</td>
<td>3</td>
</tr>
<tr>
<td>State and Local Government</td>
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<td>KINE 213</td>
<td>3</td>
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<tr>
<td>Foundations of Kinesiology</td>
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<td>Language, philosophy and culture (p. 21)</td>
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#### Term Semester Credit Hours

| Term Semester Credit Hours | 17 |

### Third Year

#### Fall

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<tbody>
<tr>
<td>BIOL 319</td>
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<tr>
<td>Integrated Human Anatomy and Physiology I</td>
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<tr>
<td>KINE 307</td>
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<td>Lifespan Motor Development</td>
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<tr>
<td>KINE 198</td>
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<td>Health and Fitness Activity</td>
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<td>KINE 199</td>
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<td>Required Physical Activity</td>
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<td>SOCI 205</td>
<td>3</td>
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<tr>
<td>Introduction to Sociology</td>
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<td>STAT 302 or STAT 303</td>
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<td>Statistical Methods or Statistical Methods</td>
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#### Term Semester Credit Hours

| Term Semester Credit Hours | 15 |

#### Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>BIOL 320</td>
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<tr>
<td>Integrated Human Anatomy and Physiology II</td>
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<td>PSYC 306</td>
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<td>Abnormal Psychology</td>
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<td>KINE 318</td>
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<td>Athletic Injuries</td>
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<tr>
<td>KINE 199</td>
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</table>

#### Term Semester Credit Hours

| Term Semester Credit Hours | 14 |

### Fourth Year

#### Fall

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<tr>
<td>KINE 406</td>
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<td>Motor Learning and Skill Performance</td>
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<td>KINE 427</td>
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<td>Therapeutic Principles</td>
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<tr>
<td>PSYC 307</td>
<td>3</td>
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<td>Developmental Psychology</td>
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<td>Professional development elective</td>
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<tr>
<td>Professional development elective</td>
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#### Term Semester Credit Hours

| Term Semester Credit Hours | 15 |

#### Spring

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<thead>
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<th>Course</th>
<th>Credit Hours</th>
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<tbody>
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<td>KINE 426</td>
<td>4</td>
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<td>Exercise Biomechanics</td>
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| Professional development elective | 3 |

| Term Semester Credit Hours | 14 |
KINE 433  Physiology of Exercise 3
KINE 482  Seminar 2 1
Professional development elective 3 3
Professional development elective 3 3

**Term Semester Credit Hours** 14

**Total Semester Credit Hours:** 120

1 Course selection should meet the International and Cultural Diversity (p. 34) Graduation requirement, if needed.
2 Meets University writing requirement. Select writing intensive section of KINE 198.
3 To be chosen in consultation with your academic advisor.
4 Participation in band or athletics cannot be used for KINE 199 credit. KINE 199 activities cannot be repeated for credit and must be taken for a grade.

### Sport Management - BS, Internship Track

The Bachelor of Science degree in Sport Management is designed to prepare students for careers as administrators and managers in athletic, health and country clubs, as well as entry-level management positions in college and professional athletic organizations. Through this program, students are prepared for a diversity of roles in the areas of sport marketing and promotions, facility management and planning, activity programming and events management. Students may elect the option that requires completion of an internship or may select the non-internship option. The internship, following coursework, provides students with on-the-job experience and networking opportunities. Students in the internship option will have also completed a business minor. The non-internship option allows students to study sport management from a specific perspective with the goal of continued educational experiences in graduate or professional school, obtaining a post-baccalaureate internship or securing an entry-level position in a sport organization. Students in the non-internship option must complete 2 minors/cognates from a list of approved minors/cognates (i.e., business, journalism, speech communications, etc.). There are common course requirements for both tracks.

### Program Requirements

This degree plan shows students the number of hours they must take each semester in order to complete the degree in four years without attending summer school. This is a suggested plan and does not have to be followed as laid out below. Students should use this information in conjunction with advising documents available from their advisor or the department website when scheduling courses each semester to ensure they are meeting all prerequisites, taking courses for admission to professional phase in a timely manner, and meeting all grade requirements.

#### First Year

**Fall**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>ENGL 103 or ENGL 104</td>
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<tr>
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<tr>
<td>MATH 141</td>
<td>Business Mathematics I</td>
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</table>

**Spring**

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>MATH 148</td>
<td>Calculus II for Biological Sciences</td>
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<td>MATH 152</td>
<td>Engineering Mathematics II</td>
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<tr>
<td>MATH 166</td>
<td>Topics in Contemporary Mathematics II</td>
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<tr>
<td>MATH 172</td>
<td>Calculus</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
</tr>
<tr>
<td>Life and physical sciences elective (p. 20)</td>
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<tr>
<td>American history elective (p. 23)</td>
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**Internship Option**

**Second Year**

**Fall**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>SPMT 220</td>
<td>Olympic Studies</td>
</tr>
<tr>
<td>SPMT 225</td>
<td>Practical Skills for Sport Professionals</td>
</tr>
<tr>
<td>ECON 202</td>
<td>Principles of Economics</td>
</tr>
<tr>
<td>KINE 120</td>
<td>The Science of Basic Health and Fitness</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
</tr>
<tr>
<td>ISYS 209</td>
<td>Business Information Systems Concepts</td>
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**Spring**

<table>
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<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ACCT 209</td>
<td>Survey of Accounting Principles</td>
</tr>
<tr>
<td>MGMT 209</td>
<td>Business, Government and Society</td>
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<tr>
<td>Creative arts elective (p. 22)</td>
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<tr>
<td>Directed Elective</td>
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<td>Free Elective</td>
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**Non-Internship Option**

**Third Year**

**Fall**

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<th>Course</th>
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<tbody>
<tr>
<td>SPMT 304</td>
<td>Sport Psychology Management and Practice</td>
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<td>SPMT 333</td>
<td>Sport Management</td>
</tr>
<tr>
<td>MGMT 309</td>
<td>Survey of Management</td>
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<td>STAT 302 or STAT 303</td>
<td>Statistical Methods or Statistical Methods</td>
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<td>Sport Management Elective</td>
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**Spring**

<table>
<thead>
<tr>
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<th>Credit Hours</th>
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**Fourth Year**

**Fall**

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**Spring**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>
Sport Management Elective 4

Directed Elective 4

Term Semester Credit Hours 15

Fourth Year
Fall
SPMT 402 Pre-Internship Field Experiences 1
SPMT 421 Legal Aspects of Sport 3
SPMT 423 Marketing Aspects of Sport 5
SPMT 482 Seminar 5
FINC 409 Survey of Finance Principles 3
Directed Elective 4

Term Semester Credit Hours 15

Spring
SPMT 484 Internship in Sport Management 12

Total Semester Credit Hours: 120

1 Must meet Core Curriculum requirements.
2 Course selection should meet the International and Cultural Diversity graduation requirement, if necessary.
3 Meets the Language, Philosophy and Culture core curriculum requirement.
4 To be chosen in consultation with academic advisor. Some electives may meet International and Cultural Diversity graduation requirement.
5 Courses meet University writing requirement.

Sport Management - BS, Non-internship Track

The Bachelor of Science degree in Sport Management is designed to prepare students for careers as administrators and managers in athletic, health and country clubs, as well as entry-level management positions in college and professional athletic organizations. Through this program, students are prepared for a diversity of roles in the areas of sport marketing and promotions, facility management and planning, activity programming and events management. Students may elect the option that requires completion of an internship or may select the non-internship option. The internship, following coursework, provides students with on-the-job experience and networking opportunities. Students in the internship option will have also completed a business minor. The non-internship option allows students to study sport management from a specific perspective with the goal of continued educational experiences in graduate or professional school, obtaining a post-baccalaureate internship or securing an entry-level position in a sport organization. Students in the non-internship option must complete 2 minors/cognates from a list of approved minors/cognates (i.e., business, journalism, speech communications, etc.). There are common course requirements for both tracks.

Program Requirements

This degree plan shows students the number of hours they must take each semester in order to complete the degree in four years without attending summer school. This is a suggested plan and does not have to be followed as laid out below. Students should use this information in conjunction with advising documents available from their advisor or the department website when scheduling courses each semester to ensure they are meeting all prerequisites, taking courses for admission to professional phase in a timely manner, and meeting all grade requirements.

First Year
Fall
ENGL 103 or ENGL 104 Introduction to Rhetoric and Composition or Composition and Rhetoric 3
Select from one of the following: 3-4
MATH 141 Business Mathematics I
MATH 148 Calculus II for Biological Sciences
MATH 152 Engineering Mathematics II
MATH 166 Topics in Contemporary Mathematics II
MATH 172 Calculus
POLS 206 American National Government 3
Life and physical sciences elective (p. 20) 1 4
American history elective (p. 23) 1,2 3

Term Semester Credit Hours 16

Spring
Select one of the following: 3
COMM 203 Public Speaking
COMM 205 Communication for Technical Professions
COMM 243 Argumentation and Debate
Select one of the following: 3-4
MATH 131 Mathematical Concepts—Calculus
MATH 142 Business Mathematics II
MATH 147 Calculus I for Biological Sciences
MATH 151 Engineering Mathematics I
MATH 171 Analytic Geometry and Calculus
SPMT 217 Foundations of Sport Management 3
Life and physical sciences elective (p. 20) 1 4
American history elective (p. 23) 1,2 3

Term Semester Credit Hours 16

Second Year
Fall
SPMT 220 Olympic Studies 3 3
SPMT 225 Practical Skills for Sport Professionals 3
ECON 202 Principles of Economics 3
Minor 4 3
KINE 120 The Science of Basic Health and Fitness 1
POLS 207 State and Local Government 3

Term Semester Credit Hours 16

Spring
KINE 240/HLTH 240 or ISYS 209 Computer Technology in Health and Kinesiology or Business Information Systems Concepts 3
 Minor 4
 Minor 4
 Minor 4
 Creative arts elective (p. 22) 1,2

<table>
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<tr>
<th>Term Semester Credit Hours</th>
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**Third Year**

**Fall**

SPMT 304  Sport Psychology Management and Practice 3
SPMT 333  Sport Management 3
STAT 302 or STAT 303  Statistical Methods or Statistical Methods 3
Sport Management Elective 5 3
Directed Elective 5 3

<table>
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**Spring**

SPMT 319/SOCI  Sociology of Sport 3
SPMT 422  Financing Sport Operations 3
Sport Management Elective 5 3
Minor 4 3

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**Fourth Year**

**Fall**

SPMT 482  Seminar 6 1
Directed Elective 5 1
Minor 4 3
Minor 4 3
Minor 4 3

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**Spring**

SPMT 421  Legal Aspects of Sport 3
SPMT 423  Marketing Aspects of Sport 6 3
SPMT 482  Seminar 1 3
Minor 4 3

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</table>

Total Semester Credit Hours: 120

---

1. Must meet Core Curriculum requirements.
2. Course selection should meet the International and Cultural Diversity Graduation requirement.
3. Meets the Language, Philosophy and Culture core curriculum requirement.
4. Students select 2 minors/cognates which range between 24 and 36 credit hours. Directed Electives range from 4-16 credit hours. See your academic advisor for a list of acceptable minors and directed electives.
5. To be chosen in consultation with academic advisor.
6. Courses meets University writing requirement.

**University Studies - BS, Dance Concentration**

The dance concentration curriculum leads to a Bachelor of Science in University Studies. It is designed to serve students who are in good academic standing with the University (2.0+ GPR) and are specifically seeking an interdisciplinary degree plan which provides preparation in dance history and production. Students complete courses in the foundations of dance, dance production, and dance composition, and technique courses in various forms of dance. Students choose their minors. This concentration is housed in the Division of Kinesiology within the Department of Health and Kinesiology.

**Program Requirements**

This degree plan has been laid out showing students the number of hours they must take each semester in order to complete the degree in four years without attending summer school. This is a suggested plan and does not have to be followed as laid out below. Students should use this information in conjunction with advising documents available from their advisor or the department website when scheduling courses each semester to ensure they are meeting all prerequisites, taking courses for admission to professional phase in a timely manner and meeting all grade requirements.

**First Year**

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<th>Semester</th>
<th>Course</th>
<th>Credit Hours</th>
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<tr>
<td>Fall</td>
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<td></td>
<td>American History Elective (p. 23)</td>
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<td></td>
<td>Life and Physical Science Elective (p. 20)</td>
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<td>Social and Behavioral Science Elective (p. 23)</td>
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**Spring**

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<tbody>
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<td>MATH 141  Business Mathematics I</td>
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<td>MATH 148  Calculus II for Biological Sciences</td>
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<td>MATH 152  Engineering Mathematics II</td>
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<td>MATH 166  Topics in Contemporary Mathematics II</td>
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<td>MATH 172  Calculus</td>
</tr>
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<td>Life and Physical Sciences Elective (p. 20)</td>
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<td>KINE/DCED Elective 2</td>
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| Elective 2,3 | 3 |

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**Second Year**

<table>
<thead>
<tr>
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<th>Course</th>
<th>Credit Hours</th>
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<tr>
<td>Fall</td>
<td>Communication Elective (p. 20)</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term Semester Credit Hours</th>
<th>15</th>
</tr>
</thead>
</table>
## University Studies - BS, Sports Conditioning Concentration

The sports conditioning concentration curriculum leads to a Bachelor of Science degree in University Studies. It is designed to serve students who are in good academic standing with the University (2.0+ GPR) and are specifically seeking an interdisciplinary degree plan which provides preparation for further study in fields or careers in coaching high performance athletes and personal training. The focus is on adult performance at collegiate, professional or fitness industry levels. Students will receive a coaching minor and will choose a second minor of their choice. This concentration is housed in the Division of Kinesiology within the Department of Health and Kinesiology.

### Program Requirements

This degree plan has been laid out showing students the number of hours they must take each semester in order to complete the degree in four years without attending summer school. This is a suggested plan and does not have to be followed as laid out below. Students should use this information in conjunction with advising documents available from their advisor or the department website when scheduling courses each semester to ensure they are meeting all prerequisites, taking courses for admission to professional phase in a timely manner and meeting all grade requirements.

## First Year

### Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 103 or ENGL 104</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 111</td>
<td>1</td>
</tr>
<tr>
<td>Social and Behavioral Sciences Elective</td>
<td>1</td>
</tr>
<tr>
<td>Creative Arts Elective</td>
<td>1</td>
</tr>
<tr>
<td>Elective</td>
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<tr>
<td>Term Semester Credit Hours</td>
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</table>

### Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select one of the following:</td>
<td>3-4</td>
</tr>
<tr>
<td>MATH 131 Mathematical Concepts—Calculus</td>
<td></td>
</tr>
<tr>
<td>MATH 142 Business Mathematics II</td>
<td></td>
</tr>
<tr>
<td>MATH 147 Calculus I for Biological Sciences</td>
<td></td>
</tr>
<tr>
<td>MATH 151 Engineering Mathematics I</td>
<td></td>
</tr>
<tr>
<td>MATH 171 Analytic Geometry and Calculus</td>
<td></td>
</tr>
<tr>
<td>PHIL 240 Introduction to Logic</td>
<td></td>
</tr>
<tr>
<td>POLS 206 American National Government</td>
<td>3</td>
</tr>
<tr>
<td>DCED 202 Dance Appreciation</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
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## Third Year

### Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>KINE 175 Gender Neutral Partnering</td>
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<tr>
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<td>Minor</td>
<td>3</td>
</tr>
<tr>
<td>Minor</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
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<tr>
<td>Term Semester Credit Hours</td>
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### Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>DCED 306 Dance Composition I</td>
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</tr>
<tr>
<td>KINE/DCED Elective</td>
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<td>3</td>
</tr>
<tr>
<td>Minor</td>
<td>3</td>
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<tr>
<td>Minor</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
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<td>Term Semester Credit Hours</td>
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</table>

## Fourth Year

### Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>DCED 400 Dance Composition II</td>
<td>2</td>
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<tr>
<td>KINE 199 Required Physical Activity</td>
<td>1</td>
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<td>KINE/DCED Elective</td>
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<tr>
<td>Minor</td>
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<tr>
<td>Minor</td>
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<td>Elective</td>
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<tr>
<td>Term Semester Credit Hours</td>
<td>16</td>
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### Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select one of the following:</td>
<td>3-4</td>
</tr>
<tr>
<td>MATH 141 Business Mathematics I</td>
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</tr>
<tr>
<td>MATH 148 Calculus II for Biological Sciences</td>
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<tr>
<td>MATH 152 Engineering Mathematics II</td>
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<tr>
<td>MATH 166 Topics in Contemporary Mathematics II</td>
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<tr>
<td>MATH 172 Calculus</td>
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### Term Semester Credit Hours

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>ENGL 103 or ENGL 104</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 104 Composition and Rhetoric</td>
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<tr>
<td>BIOL 111 Introductory Biology I</td>
<td>4</td>
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<tr>
<td>American History Elective (p. 23)</td>
<td>3</td>
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<tr>
<td>Social and Behavioral Sciences Elective (p. 23)</td>
<td>3</td>
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<tr>
<td>Creative Arts Elective (p. 22)</td>
<td>3</td>
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<tr>
<td>Term Semester Credit Hours</td>
<td>16</td>
</tr>
</tbody>
</table>

### Total Semester Credit Hours

1. Must meet Core Curriculum requirements.
2. Select electives in consultation with advisor.
3. Some electives should be selected to meet the International and Cultural Diversity graduation requirement.
5. Must be a specific activity. See advisor for required activity.
KINE 120  The Science of Basic Health and Fitness 1  
KINE 215  Fundamentals of Coaching 1  
HLTH 216  First Aid 2  
Life and Physical Sciences Elective (p. 20) 1 4  
American History Elective (p. 23) 1,2 3  

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second Year</td>
<td></td>
<td>14</td>
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<tr>
<td>Fall</td>
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<td>14</td>
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<tr>
<td>Communication Elective 1</td>
<td></td>
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<tr>
<td>Select one of the following:</td>
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<td>3-4</td>
</tr>
<tr>
<td>MATH 131  Mathematical Concepts—Calculus</td>
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<td>3</td>
</tr>
<tr>
<td>MATH 142  Business Mathematics II</td>
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<tr>
<td>MATH 147  Calculus I for Biological Sciences</td>
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<td>3</td>
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<tr>
<td>MATH 151  Engineering Mathematics I</td>
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<td>3</td>
</tr>
<tr>
<td>MATH 171  Analytic Geometry and Calculus</td>
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<td>3</td>
</tr>
<tr>
<td>PHIL 240  Introduction to Logic</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>POLS 206  American National Government</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>KINE 121  Physical and Motor Fitness Assessment</td>
<td></td>
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</tr>
<tr>
<td>KINE 199  Required Physical Activity 2</td>
<td></td>
<td>1</td>
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<tr>
<td>KINE 213  Foundations of Kinesiology</td>
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<tr>
<td>Spring</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>POLS 207  State and Local Government</td>
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<td>3</td>
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<tr>
<td>NUTR 202  Fundamentals of Human Nutrition</td>
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<td>3</td>
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<tr>
<td>KINE 198  Health and Fitness Activity 4</td>
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<tr>
<td>Language, Philosophy and Culture Elective (p. 21) 1,2</td>
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<tr>
<td>Coaching Elective 4</td>
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<tr>
<td>Minor</td>
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<tr>
<td>Third Year</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Fall</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>KINE 306  Functional Anatomy for Coaches</td>
<td></td>
<td>1</td>
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<tr>
<td>KINE 305  Sport Nutrition</td>
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<td>3</td>
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<tr>
<td>Coaching Elective 4</td>
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<tr>
<td>Minor</td>
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<td>3</td>
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<tr>
<td>Minor</td>
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<td>3</td>
</tr>
<tr>
<td>Minor</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Elective 2,4</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>KINE 302  Applied Exercise Physiology for Coaches</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>KINE 307  Lifespan Motor Development</td>
<td></td>
<td>3</td>
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<tr>
<td>KINE 431 or Ropes Course and Group Process or KINE 485  Directed Studies</td>
<td></td>
<td>3</td>
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<tr>
<td>Elective 2,4</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Elective 2,4</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Coaching Elective 4</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Fourth Year</td>
<td></td>
<td>15</td>
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<tr>
<td>Fall</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>KINE 318  Athletic Injuries</td>
<td></td>
<td>3</td>
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</table>

KINE 386  Sport Physiology 3  
KINE 482  Seminar 5  
SPMT 421  Legal Aspects of Sport 3  
Minor |  | 3          |
| Elective 2,4 |  | 3          |
| Elective 2,4 |  | 3          |

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
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<tr>
<td>KINE 404  Coaching Psychology</td>
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<td>3</td>
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<tr>
<td>KINE 491  Research</td>
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<tr>
<td>Minor</td>
<td></td>
<td>3</td>
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<tr>
<td>Minor</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Elective 2,4</td>
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<td>3</td>
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<tr>
<td>Total Semester Credit Hours:</td>
<td></td>
<td>120</td>
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</tbody>
</table>

1  Must meet Core Curriculum requirements.  
2  Some electives should meet the International and Cultural Diversity graduation requirement.  
3  Must be a specific activity class. See advisor for appropriate course.  
4  Select electives in consultation with advisor.  
5  Meets Core Curriculum writing requirement.

University Studies - BS, Sports Leadership Concentration

The sports leadership concentration curriculum leads to a Bachelor of Science degree in University Studies. It is designed to serve students who are in good academic standing with the University (2.0+ GPR) and are specifically seeking an interdisciplinary degree plan which provides preparation for further study in a wide-variety of sport-related fields or careers such as nonprofit sports groups, youth sports institutions, and community agencies focused on sports. Curriculum will be designed to train and prepare students to become leaders, not managers, in sport-related agencies and businesses. Students choose their minors. This concentration is housed in the Division of Sport Management within the Department of Health and Kinesiology.

Program Requirements

This degree plan has been laid out showing students the number of hours they must take each semester in order to complete the degree in four years without attending summer school. This is a suggested plan and does not have to be followed as laid out below. Students should use this information in conjunction with advising documents available from their advisor or the department website when scheduling courses each semester to ensure they are meeting all prerequisites, taking courses for admission to professional phase in a timely manner and meeting all grade requirements.

First Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>ENGL 103 or ENGL 104  Introduction to Rhetoric and Composition or Composition and Rhetoric</td>
<td></td>
</tr>
<tr>
<td>Term</td>
<td>Semester Credit Hours</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Spring</td>
<td>14</td>
</tr>
<tr>
<td>Fall</td>
<td>13</td>
</tr>
<tr>
<td>Fall</td>
<td>14</td>
</tr>
<tr>
<td>Spring</td>
<td>15</td>
</tr>
<tr>
<td>Summer</td>
<td>16</td>
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<td>Fall</td>
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<tr>
<td>Spring</td>
<td>15</td>
</tr>
<tr>
<td>Summer</td>
<td>18</td>
</tr>
</tbody>
</table>

1. Must meet Core Curriculum requirements.
2. Some electives should meet the International and Cultural Diversity graduation requirement.
4. Select electives in consultation with advisor.
5. Select sections to meet the Core Curriculum writing requirement.

**Coaching - Minor**

This minor is also useful to those who work with youth in sports leagues. Admission to this minor is by application only. Students should allow a minimum of three semesters to complete this minor.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>KINE 199</td>
<td>Required Physical Activity (with HKCO attribute)</td>
<td>1</td>
</tr>
<tr>
<td>KINE 215</td>
<td>Fundamentals of Coaching</td>
<td>1</td>
</tr>
<tr>
<td>HLTH 216</td>
<td>First Aid</td>
<td>2</td>
</tr>
<tr>
<td>KINE 302</td>
<td>Applied Exercise Physiology for Coaches</td>
<td>1</td>
</tr>
<tr>
<td>KINE 306</td>
<td>Functional Anatomy for Coaches</td>
<td>1</td>
</tr>
<tr>
<td>KINE 307</td>
<td>Lifespan Motor Development</td>
<td>3</td>
</tr>
<tr>
<td>KINE 318</td>
<td>Athletic Injuries</td>
<td>3</td>
</tr>
<tr>
<td>KINE 312</td>
<td>Coaching of Baseball</td>
<td>3</td>
</tr>
<tr>
<td>KINE 317</td>
<td>Coaching of Football</td>
<td>3</td>
</tr>
<tr>
<td>KINE 321</td>
<td>Coaching of Volleyball</td>
<td>3</td>
</tr>
<tr>
<td>KINE 351</td>
<td>Coaching of Basketball</td>
<td>3</td>
</tr>
<tr>
<td>KINE 355</td>
<td>Coaching of Track</td>
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</tr>
</tbody>
</table>

**Total Semester Credit Hours:** 18
Students must make a grade of "C" or better in all courses.

**Dance - Minor**

A minor in dance can lead to numerous opportunities within the field of dance performance and education. Students can obtain the necessary tools to teach, choreograph and direct in high schools, private studios, performance groups, dance/drill teams, dance within community and/ or companies, or utilize their minor studies to pursue degrees in dance. Dance is considered to be an important part of the visual and performing arts educational experience. Studies of dance performance, education and history can enhance a student's academic experience.

Dance students are part of the Dance Program (http://tamudance.tamu.edu), and have the opportunity to participate in events throughout the year.

**Performance**

Performance opportunities include: an annual dance concert (Perpetual Motion), Faculty Arts Showcase, Choreographers' Showcase, Senior Concerts, informal performances, student organization concerts, performances throughout the community and on campus and state, regional, and national/international gala performances. Dance faculty often receive grants for other performances throughout the university in collaboration with faculty from other colleges. Students are also given the opportunity to attend various festivals and conferences.

The Dance Program also offers students the capability to work with guest artists (http://dance.tamu.edu/people/guest-artists) in master classes, watching performances and learning repertory. This not only gives students an unique opportunity to build their resumes, but to work with a variety of professionals in the field.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCED 202</td>
<td>Dance Appreciation</td>
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</tr>
<tr>
<td>DCED 203</td>
<td>Dance Production</td>
<td>3</td>
</tr>
<tr>
<td>DCED 306</td>
<td>Dance Composition I</td>
<td>2</td>
</tr>
<tr>
<td>KINE 175</td>
<td>Gender Neutral Partnering</td>
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<tr>
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<td>Required Physical Activity</td>
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<td>Select four hours from the following:</td>
<td></td>
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<tr>
<td>DCED 171</td>
<td>Modern Dance I</td>
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</tr>
<tr>
<td>DCED 172</td>
<td>Modern Dance II</td>
<td></td>
</tr>
<tr>
<td>DCED 173</td>
<td>Modern Dance III</td>
<td></td>
</tr>
<tr>
<td>KINE 271</td>
<td>Movement Lab: Modern Dance I</td>
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</tr>
<tr>
<td>KINE 372</td>
<td>Movement Lab: Modern Dance II</td>
<td></td>
</tr>
<tr>
<td>KINE 473</td>
<td>Movement Lab: Modern Dance III</td>
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<td>Select four hours from the following:</td>
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<tr>
<td>DCED 160</td>
<td>Ballet I</td>
<td></td>
</tr>
<tr>
<td>DCED 161</td>
<td>Ballet II</td>
<td></td>
</tr>
<tr>
<td>DCED 162</td>
<td>Ballet III</td>
<td></td>
</tr>
<tr>
<td>KINE 260</td>
<td>Movement Lab: Ballet I</td>
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</tr>
<tr>
<td>KINE 361</td>
<td>Movement Lab: Ballet II</td>
<td></td>
</tr>
<tr>
<td>KINE 462</td>
<td>Movement Lab: Ballet III</td>
<td></td>
</tr>
<tr>
<td>Total Semester Credit Hours</td>
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<td>18</td>
</tr>
</tbody>
</table>

**Sport Management - Minor**

The minor provides a foundational understanding of the multifarious sport industry from the perspectives of management, marketing and other business principles. The minor provides an introductory understanding of the broadly defined sport management discipline and potential careers that can be leveraged in the sport industry.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPMT 217</td>
<td>Foundations of Sport Management</td>
<td>3</td>
</tr>
<tr>
<td>SPMT 482</td>
<td>Seminar (3 times)</td>
<td>3</td>
</tr>
<tr>
<td>Select three of the following:</td>
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<tr>
<td>SPMT 304</td>
<td>Sport Psychology Management and Practice</td>
<td></td>
</tr>
<tr>
<td>SPMT 319</td>
<td>Sociology of Sport</td>
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</tr>
<tr>
<td>SOCI 319</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPMT 336</td>
<td>Diversity in Sport Organizations</td>
<td>2</td>
</tr>
<tr>
<td>SPMT 337</td>
<td>International Sport Business</td>
<td>2</td>
</tr>
<tr>
<td>Total Semester Credit Hours</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

1. Topics for the seminar classes include: Sport Sponsorship, Athletic Administration and Sport and the Media.
2. Courses meet International and Cultural Diversity requirement

Students must make a grade of "C" or better in all courses.

**Department of Teaching, Learning and Culture**

The Department of Teaching, Learning and Culture is responsible for undergraduate programs that lead to certification at the early childhood/elementary, middle and secondary levels. Note these exceptions:

1. students interested in teaching either health or physical education must major in the Department of Health and Kinesiology;
2. students interested in teaching agricultural science must major in the Department of Agricultural Education;
3. students interested in secondary certification can be certified through the secondary graduate certification program, the secondary accelerate certification program, the University Studies program or the Aggie Teach program.

**Early Childhood/Elementary or Middle Grades Certification**

Baccalaureate Degree Programs. Most students interested in early childhood/elementary (PreK-6) or middle school (4–8) certification pursue a program leading to the Bachelor of Science degree (BS) with a major in interdisciplinary studies (INST). The INST degree certification programs prepare students for the many diverse instructional roles assumed by public school teachers. A minimum of 123 credit hours is required for the INST degree. Within this program, students may focus on:

1. early childhood (PreK–grade 6);
2. middle school (grades 4–8 math and science); and
3. middle school (grades 4–8 English language arts and social studies).
Secondary Graduate Certification Program

Four routes leading to initial teacher certification at the secondary level are available. These include the Aggie Teach program, the University Studies program, the graduate certification program and Accelerate (an alternative certification program). Complete information is available from the TLAC advising office in Heaton Hall.

Requirements for Admission to Student Teaching

1. Complete a student teaching application by the given deadlines and complete all coursework prior to senior methods. Students must see their advisors for deadlines.
2. Admission to teacher education.
3. Completion of all courses listed on the degree plan. All Education/Interdisciplinary Studies and professional courses with a grade of C or better.
4. All certification coursework must be completed. Each emphasis/teaching field must have a grade of C or better in each course with a minimum GPR of 2.75 in teacher emphasis/teaching field.
5. ENGL 203 or ENGL 210 must be completed with a grade of C or better.
6. A minimum of 2.75 on all coursework completed at Texas A&M.
7. A minimum of 2.75 on all coursework that applies to the degree plan, taken at Texas A&M.
8. A minimum of 2.75 on all coursework that applies to the emphasis/teaching field, taken at Texas A&M.

Faculty

Beachy, Rachel R, Assistant Lecturer
Teaching, Learning & Culture
MA, Texas A&M University-Commerce, 2007

Boettcher, Cynthia K, Clinical Professor
Teaching, Learning & Culture
PhD, Texas A&M University, 1998

Bozeman, Todd D, Lecturer
Teaching, Learning & Culture
PhD, Texas A&M University, 2010

Bryan, Kisha C, Clinical Assistant Professor
Teaching, Learning & Culture
PhD, University of Florida, 2012

Burlbaw, Lynn M, Professor
Teaching, Learning & Culture
PhD, University of Texas, 1989

Caldwell, Heather L, Lecturer
Teaching, Learning & Culture
PhD, Texas A&M University, 2009

Cantrell, Emily S, Clinical Assistant Professor
Teaching, Learning & Culture
PhD, Texas A&M University, 2008

Capraro, Mary M, Associate Professor
Teaching, Learning & Culture
PhD, University of Southern Mississippi, 2000

Requirements for Admission to Teaching Education

Early Childhood/Elementary or Middle Grades Certification Programs

Please see an advisor in the Department of Teaching, Learning and Culture’s Office of Undergraduate Advising for current information.

Requirements for Admission to Teacher Education

Early Childhood/Elementary and Middle Grades Education Program

1. Pass the THEA, ACCUPLACER, ASSET or COMPASS test or show proof of exemption from the test with appropriate STAAR, SAT or ACT scores.
2. Completion of a minimum 42 hours of pre-professional coursework from degree program (includes University Core Curriculum courses).
3. Completion of a minimum of 32 hours of University Core Curriculum courses with no grade lower than a C.
4. Completion of TEFB 273 or INST 210 with a grade of B or higher (equivalent courses from a community college may be substituted).
5. Completion of English Proficiency grade requirement by earning a B/C grade combination in ENGL 103 or ENGL 104 and one of the following courses: ENGL 203 or ENGL 210.
6. A GPR of 2.75 on all coursework on a degree plan with no grade lower than a C.
7. Transcripts for all institutions of higher education on file in the Texas A&M University Office of the Registrar.
8. Approved and signed degree plan on file in the Advising Office of the Department of Teaching, Learning and Culture.

These requirements must be seen as minimum standards only. Successful fulfillment of all of the above requirements does not guarantee admission to the program. Admission also depends upon the number of places available and the number of applications received each year. If more qualified students apply than the available number of spaces, admission may be based on selection factors at the time of application, such as GPA in pre-professional courses, number of hours needed to complete the program, and enrollment in prerequisite courses.

For complete information, see an advisor in the Department of Teaching, Learning and Culture’s Office of Undergraduate Advising in Heaton Hall.

There is another baccalaureate elementary certification program available for students majoring in English. For information about this program, see an advisor in the Department of English, College of Liberal Arts.

Eligibility. Students must meet the requirements for a bachelor’s degree in the college and the department in which they are majoring. Further, they must meet specific admission and performance standards established by the Department of Teaching, Learning and Culture as well as requirements for professional education and certification established by the State of Texas. These requirements include admission to teacher education, admission to student teaching and qualification for initial certification.

It is the responsibility of the student to contact the Department of Teaching, Learning and Culture’s Office of Undergraduate Advising for specific information pertaining to program changes.
Capraro, Robert M, Professor  
Teaching, Learning & Culture  
PhD, University of Southern Mississippi, 2000

Carter, Norvella P, Professor  
Teaching, Learning & Culture  
PhD, Loyola University, 1990

Cassell, Edith C, Clinical Associate Professor  
Teaching, Learning & Culture  
PhD, Purdue University, 2007

Davis, Trina J, Associate Professor  
Teaching, Learning & Culture  
PhD, Texas A&M University, 2005

Dixon, Laurie Q, Associate Professor  
Teaching, Learning & Culture  
EDD, Harvard University, 2004

Douglass, April G, Clinical Assistant Professor  
Teaching, Learning & Culture  
PhD, Texas A&M University, 2011

Eslami, Zohreh R, Associate Professor  
Teaching, Learning & Culture  
PhD, University of Illinois at Urbana-Champaign, 1992

Frieda, Dianna R, Assistant Lecturer  
Teaching, Learning & Culture  
MS, Texas A&M University, 1984

Goldsby, Dianne S, Clinical Professor  
Teaching, Learning & Culture  
PhD, University of New Orleans, 1994

Griffith, Karee, Lecturer  
Teaching, Learning & Culture  
PhD, University of Mary Hardin-Baylor, 1993

Hammer, Janet E, Clinical Professor  
Teaching, Learning & Culture  
PhD, University of Texas, 2003

Helfeldt, John P, Professor  
Teaching, Learning & Culture  
PhD, Syracuse University, 1973

Hill-Jackson, Valerie L, Clinical Professor  
Teaching, Learning & Culture  
PhD, St. Joseph's University, 2003

James, Marlon C, Assistant Professor  
Teaching, Learning & Culture  
PhD, Texas A&M University, 2008

Jolly, Ashley G, Assistant Lecturer  
Teaching, Learning & Culture  
MS, Sam Houston State University, 2007

Joshi, R M, Professor  
Teaching, Learning & Culture  
PhD, University of South Carolina, 1976

Kelly, Larry J, Clinical Professor  
Teaching, Learning & Culture  
PhD, University of Texas, Austin, 2002

Kerekes, Angela M, Assistant Lecturer  
Teaching, Learning & Culture  
MEd, Texas A&M University, 2011

Koebernick, Douglas A, Assistant Lecturer  
Teaching, Learning & Culture  
MS, University of Texas, Pan American, 1975

Kulm, Gerald, Senior Professor  
Teaching, Learning & Culture  
PhD, Columbia University, 1971

Kuo, Li-Jen, Associate Professor  
Teaching, Learning & Culture  
PhD, University of Illinois at Urbana-Champaign, 2006

Larke, Patricia J, Professor  
Teaching, Learning & Culture  
EdD, University of Missouri, 1984

Laub, James D, Clinical Assistant Professor  
Teaching, Learning & Culture  
PhD, Texas A&M University, 2012

Li, Yeping, Professor  
Teaching, Learning & Culture  
PhD, University of Pittsburgh, 1999

Matthews, Sharon D, Clinical Assistant Professor  
Teaching, Learning & Culture  
PhD, New Mexico State University, 2007

McTigue, Erin, Associate Professor  
Teaching, Learning & Culture  
PhD, University of Virginia, 2006

Middlebrooks, Mary W, Assistant Lecturer  
Teaching, Learning & Culture  
MS, Sam Houston State University, 1973

Neshyba, Monica V, Clinical Assistant Professor  
Teaching, Learning & Culture  
PhD, University of Texas, Austin, 2012

Palmer, Darlene A, Assistant Lecturer  
Teaching, Learning & Culture  
MS, Texas A&M University, 1988

Parker, Dawn R, Clinical Professor  
Teaching, Learning & Culture  
PhD, Texas A&M University, 1997

Rackley, Robin A, Clinical Professor  
Teaching, Learning & Culture  
PhD, Texas A&M University, 2004

Rupley, William H, Professor  
Teaching, Learning & Culture  
PhD, University of Illinois at Urbana-Champaign, 1975
Salazar, Katherine N, Assistant Lecturer  
Teaching, Learning & Culture  
MS, Texas A&M University, 2012

Shields, Samantha M, Assistant Lecturer  
Teaching, Learning & Culture  
MEd, Texas A&M University, 1998

Shumbera, Kristen L, Assistant Lecturer  
Teaching, Learning & Culture  
MS, University of Florida, 2007

Singleton, Julie A, Clinical Assistant Professor  
Teaching, Learning & Culture  
PhD, Texas A&M University, 2011

Slattery, Geor, Professor  
Teaching, Learning & Culture  
PhD, Louisiana State University, 1989

Stuessy, Carol L, Associate Professor  
Teaching, Learning & Culture  
PhD, Ohio State University, 1984

Thomas, Rebecca S, Lecturer  
Teaching, Learning & Culture  
MEd, Texas A&M University, 1998

Viruru, Radhika, Clinical Professor  
Teaching, Learning & Culture  
PhD, Texas A&M University, 1998

Walters, Lynne M, Associate Professor  
Teaching, Learning & Culture  
PhD, University of Wisconsin-Madison, 1977

Waxman, Hersholt C, Professor  
Teaching, Learning & Culture  
PhD, University of Illinois, 1982

Wijekumar, Kausalai, Professor  
Teaching, Learning & Culture  
PhD, Pennsylvania State University, 2000

Williams, Kamala V, Lecturer  
Teaching, Learning & Culture  
PhD, Texas A&M University, 2010

Wright, Kimberly B, Assistant Lecturer  
Teaching, Learning & Culture  
MS, Texas A&M University, 2008

Yalvac, Bugrahan, Associate Professor  
Teaching, Learning & Culture  
PhD, Pennsylvania State University, 2005

Majors

• Bachelor of Science in Interdisciplinary Studies, Pre-K-6, Generalist Certification (p. 283)
• Bachelor of Science in Interdisciplinary Studies, English Language Arts/Social Studies, Middle Grades Certification (p. 285)

Certification

• Secondary Graduate Certification Program (p. 286)

Minors

• Applied Learning-Science, Technology, Engineering and Mathematics (STEM) Minor (p. 287)

Interdisciplinary Studies - BS, Pre-K-6, Generalist Certification

Programs in the Department of Teaching, Learning and Culture are based upon new State of Texas standards. Students should check with the advisors in the appropriate departments to receive the most current programs, policies and procedures.

Program Requirements

First Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>ENGL 103 or ENGL 104</td>
<td>Introduction to Rhetoric and Composition or Composition and Rhetoric</td>
</tr>
<tr>
<td>HIST 105 or HIST 106</td>
<td>History of the United States or History of the United States</td>
</tr>
<tr>
<td>MATH 141 or MATH 166</td>
<td>Business Mathematics I or Topics in Contemporary Mathematics II</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
</tr>
<tr>
<td>TEFB 273</td>
<td>Introduction to Culture, Community, Society and Schools</td>
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</table>

| Term Semester Credit Hours | 15 |

Spring

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
</tr>
<tr>
<td>GEOG 202</td>
<td>Geography of the Global Village</td>
</tr>
<tr>
<td>HIST 226</td>
<td>History of Texas</td>
</tr>
<tr>
<td>MATH 131 or MATH 142</td>
<td>Mathematical Concepts—Calculus or Business Mathematics II</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
</tr>
</tbody>
</table>

| Term Semester Credit Hours | 15 |

Summer

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>BIOL 111 or BIOL 113</td>
<td>Introductory Biology I or Essentials in Biology</td>
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| Term Semester Credit Hours | 4 |

Second Year

Fall

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MASC 351</td>
<td>Problem Solving in Mathematics</td>
</tr>
<tr>
<td>MATH 365</td>
<td>Structure of Mathematics I</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td>4</td>
</tr>
<tr>
<td>GEOG 203 &amp; GEOG 213</td>
<td>Planet Earth and Planet Earth Lab</td>
</tr>
<tr>
<td>GEOL 101</td>
<td>Principles of Geology</td>
</tr>
<tr>
<td>INST 210</td>
<td>Understanding Special Populations</td>
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### Creative arts elective (p. 22)

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>Spring</td>
<td>16</td>
</tr>
<tr>
<td>INST 222</td>
<td>Foundations of Education in a Multicultural Society</td>
</tr>
<tr>
<td>KINE 120</td>
<td>The Science of Basic Health and Fitness</td>
</tr>
<tr>
<td>MASC 371</td>
<td>Inquiries in Life and Earth Sciences</td>
</tr>
<tr>
<td>MATH 366</td>
<td>Structure of Mathematics II</td>
</tr>
<tr>
<td>RDNG 351</td>
<td>Reading in the Elementary School</td>
</tr>
<tr>
<td>RDNG 361</td>
<td>Assessment in Reading Instruction</td>
</tr>
<tr>
<td>Term Semester Credit Hours</td>
<td>16</td>
</tr>
<tr>
<td>Summer</td>
<td>3</td>
</tr>
<tr>
<td>EPSY 435 or STAT 303</td>
<td>Educational Statistics or Statistical Methods</td>
</tr>
<tr>
<td>GEOG 201</td>
<td>Introduction to Human Geography</td>
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<td>Term Semester Credit Hours</td>
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### Third Year

#### Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>INST 362</td>
<td>English as a Second Language Methods I</td>
</tr>
<tr>
<td>RDNG 461</td>
<td>Teaching Reading Through Children’s Literature</td>
</tr>
<tr>
<td>EDCI 365</td>
<td>Using Technology Classrooms</td>
</tr>
<tr>
<td>EDCI 353</td>
<td>Early Childhood through Adolescent Education</td>
</tr>
<tr>
<td>HIST 319</td>
<td>U.S. Immigration and Ethnicity</td>
</tr>
<tr>
<td>Term Semester Credit Hours</td>
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#### Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>EDCI 354</td>
<td>Early Childhood and Adolescent Curriculum and Lesson Design</td>
</tr>
<tr>
<td>INST 363</td>
<td>English as a Second Language Methods II</td>
</tr>
<tr>
<td>MASC 475</td>
<td>Inquiries in Physical Science</td>
</tr>
<tr>
<td>RDNG 468</td>
<td>Essential Foundations of Language and Literacy for All Learners</td>
</tr>
<tr>
<td>TEFB 371</td>
<td>Dynamics and Management in Multicultural/Inclusionary Learning Environments</td>
</tr>
<tr>
<td>Term Semester Credit Hours</td>
<td>15</td>
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</table>

#### Summer

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>HIST 361</td>
<td>Technology and Engineering in Western Civilization, 1400-Present</td>
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<tr>
<td>Term Semester Credit Hours</td>
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### Fourth Year

#### Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>RDNG 467</td>
<td>Reading and the Language Arts</td>
</tr>
<tr>
<td>TEFB 410</td>
<td>Social Studies and the Humanities in the Elementary School</td>
</tr>
<tr>
<td>TEFB 412</td>
<td>Mathematics in the Elementary School</td>
</tr>
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<td>TEFB 413</td>
<td>Science in the Elementary School</td>
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#### Spring

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<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>TEFB 426</td>
<td>Supervised Clinical Teaching</td>
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<tr>
<td>Term Semester Credit Hours</td>
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</table>

### Total Semester Credit Hours: 123

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### Interdisciplinary Studies, BS, Math/Science, Middle Grades Certification

Programs in the Department of Teaching, Learning and Culture are based upon new State of Texas standards. You must consult with an advisor in the Department of Teaching, Learning and Culture (Heaton Hall) prior to enrolling in coursework each semester or term.

#### Program Requirements

### First Year

#### Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>BIOL 111 or BIOL 113</td>
<td>Introductory Biology I or Essentials in Biology</td>
</tr>
<tr>
<td>ENGL 103 or ENGL 104</td>
<td>Introduction to Rhetoric and Composition or Composition and Rhetoric</td>
</tr>
<tr>
<td>HIST 105 or HIST 106</td>
<td>History of the United States or History of the United States</td>
</tr>
<tr>
<td>MATH 141 or MATH 142</td>
<td>Business Mathematics I or Topics in Calculus or Business Mathematics II</td>
</tr>
<tr>
<td>TEFB 273</td>
<td>Introduction to Culture, Community, Society and Schools</td>
</tr>
<tr>
<td>Term Semester Credit Hours</td>
<td>16</td>
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#### Summer

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>PHYS 205</td>
<td>Concepts of Physics</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
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</table>

#### Second Year

#### Fall

Select one of the following:

- GEOG 203 & GEOG 213 | Planet Earth and Planet Earth Lab |
- GEOL 101 | Principles of Geology |
- MASC 351 | Problem Solving in Mathematics |
- MATH 365 | Structure of Mathematics I |
- POLS 207 | State and Local Government |
- Elective | 3 |
| Term Semester Credit Hours | 16 |

#### Spring

Select one of the following:

- GEOG 203 | Planet Earth and Planet Earth Lab |
- GEOL 101 | Principles of Geology |
- MASC 351 | Problem Solving in Mathematics |
- MATH 365 | Structure of Mathematics I |
- POLS 207 | State and Local Government |
- Elective | 3 |
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory I</td>
<td>Summer</td>
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<tr>
<td>&amp; CHEM 111</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>CHEM 106</td>
<td>Molecular Science for Citizens and Molecular Science for Citizens Laboratory</td>
<td>Summer</td>
<td>3</td>
</tr>
<tr>
<td>&amp; CHEM 116</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INST 210</td>
<td>Understanding Special Populations</td>
<td>Summer</td>
<td>3</td>
</tr>
<tr>
<td>INST 222</td>
<td>Foundations of Education in a Multicultural Society</td>
<td>Summer</td>
<td>3</td>
</tr>
<tr>
<td>MASC 371</td>
<td>Inquiries in Life and Earth Sciences</td>
<td>Summer</td>
<td>3</td>
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<tr>
<td>MATH 366</td>
<td>Structure of Mathematics II</td>
<td>Summer</td>
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<tr>
<td>STAT 303</td>
<td>Statistical Methods</td>
<td>Summer</td>
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<tr>
<td>MATH 367</td>
<td>Basic Concepts of Geometry</td>
<td>Summer</td>
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<td></td>
<td><strong>Third Year</strong></td>
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<tr>
<td>Fall</td>
<td>EDCI 365</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>EDCI 353</td>
<td>Early Childhood through Adolescent Education</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>INST 362</td>
<td>English as a Second Language Methods I</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>KINE 120</td>
<td>The Science of Basic Health and Fitness</td>
<td>Fall</td>
<td>1</td>
</tr>
<tr>
<td>RDNG 468</td>
<td>Essential Foundations of Language and Literacy for All Learners</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>MASC 475</td>
<td>Inquiries in Physical Science</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Term Semester Credit Hours</strong></td>
<td>Fall</td>
<td><strong>16</strong></td>
</tr>
<tr>
<td>EDCI 354</td>
<td>Early Childhood and Adolescent Curriculum and Lesson Design</td>
<td>Spring</td>
<td>3</td>
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<tr>
<td>INST 363</td>
<td>English as a Second Language Methods II</td>
<td>Spring</td>
<td>3</td>
</tr>
<tr>
<td>MASC 450</td>
<td>Integrated Mathematics</td>
<td>Spring</td>
<td>3</td>
</tr>
<tr>
<td>RDNG 371</td>
<td>Multicultural and Interdisciplinary Literature for Middle Grades</td>
<td>Spring</td>
<td>3</td>
</tr>
<tr>
<td>TEFB 371</td>
<td>Dynamics and Management in Multicultural/Inclusionary Learning Environments</td>
<td>Spring</td>
<td>3</td>
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<tr>
<td></td>
<td><strong>Term Semester Credit Hours</strong></td>
<td>Spring</td>
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<tr>
<td>MEFB 452</td>
<td>Curriculum and Instruction for Middle Grades</td>
<td>Fall</td>
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<tr>
<td>MEFB 460</td>
<td>Math Methods in Middle Grades</td>
<td>Fall</td>
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</tr>
<tr>
<td>MEFB 470</td>
<td>Science Methods in Middle Grades</td>
<td>Fall</td>
<td>3</td>
</tr>
<tr>
<td>RDNG 490</td>
<td>Assessment in Reading Instruction in Middle Grades</td>
<td>Fall</td>
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<td></td>
<td><strong>Term Semester Credit Hours</strong></td>
<td>Fall</td>
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<tr>
<td>MEFB 497</td>
<td>Supervised Clinical Teaching</td>
<td>Spring</td>
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<td><strong>Term Semester Credit Hours</strong></td>
<td>Spring</td>
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**Program Requirements**

**First Year**

<table>
<thead>
<tr>
<th>Term</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>ENGL 103 or</td>
<td>Introduction to Rhetoric and Composition or Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ENGL 104</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>GEOG 201 or</td>
<td>Introduction to Human Geography or Geography of the Global Village</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>GEOG 202</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HIST 105</td>
<td>History of the United States</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MATH 141 or</td>
<td>Business Mathematics I or Topics in Contemporary Mathematics II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MATH 166</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TEFB 273</td>
<td>Introduction to Culture, Community, Society and Schools</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Term Semester Credit Hours</strong></td>
<td><strong>15</strong></td>
</tr>
<tr>
<td>Spring</td>
<td>ECON 202 or</td>
<td>Principles of Economics or Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ECON 203</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ENGL 203 or</td>
<td>Writing about Literature or Technical and Business Writing</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ENGL 210</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HIST 106</td>
<td>History of the United States</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MATH 131 or</td>
<td>Mathematical Concepts—Calculus or Business Mathematics II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MATH 142</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TEFB 371</td>
<td>Creative arts (p. 22)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Term Semester Credit Hours</strong></td>
<td><strong>15</strong></td>
</tr>
<tr>
<td>Summer</td>
<td>BIOL 111 or</td>
<td>Introductory Biology I or Essentials in Biology</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>BIOL 113</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Term Semester Credit Hours</strong></td>
<td><strong>7</strong></td>
</tr>
</tbody>
</table>

**Second Year**

<table>
<thead>
<tr>
<th>Term</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>ENGL 227 or</td>
<td>American Literature: The Beginnings to Civil War or American Literature: Civil War to Present</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ENGL 228</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Select one of the following:</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GEOF 203 Planet Earth</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>GEOF 213 and Planet Earth Lab</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>GEOL 101 Principles of Geology</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>HIST 226 or HIST History of Texas or Texas Since 1845</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>416</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>INST 210 Understanding Special Populations</td>
<td>3</td>
</tr>
</tbody>
</table>

**Interdisciplinary Studies, BS, English Language Arts/ Social Studies, Middle Grades Certification**

Programs in the Department of Teaching, Learning and Culture are based upon new State of Texas standards. You must consult with an advisor in the Department of Teaching, Learning and Culture (Heaton Hall) prior to enrolling in coursework each semester or term.
<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>16</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
</tr>
<tr>
<td>ENGL 323</td>
<td>The American Renaissance 3</td>
</tr>
<tr>
<td>ENGL 336</td>
<td>Life and Literature of the Southwest 3</td>
</tr>
<tr>
<td>ENGL 362/</td>
<td>HISP 362</td>
</tr>
<tr>
<td>GEOG 301</td>
<td>Geography of the United States 3</td>
</tr>
<tr>
<td>INST 222</td>
<td>Foundations of Education in a Multicultural Society 3</td>
</tr>
<tr>
<td>KINE 120</td>
<td>The Science of Basic Health and Fitness 1</td>
</tr>
<tr>
<td>MASC 351</td>
<td>Problem Solving in Mathematics 3</td>
</tr>
<tr>
<td>RDNG 371</td>
<td>Multicultural and Interdisciplinary Literature for Middle Grades 3</td>
</tr>
<tr>
<td>Summer</td>
<td>16</td>
</tr>
<tr>
<td>EPSY 435 or STAT 303</td>
<td>Educational Statistics or Statistical Methods 3</td>
</tr>
<tr>
<td>HIST 352/ASIA 352</td>
<td>Modern East Asia 3</td>
</tr>
<tr>
<td>Third Year</td>
<td>6</td>
</tr>
<tr>
<td>Fall</td>
<td>15</td>
</tr>
<tr>
<td>EDCI 365</td>
<td>Using Technology Classrooms 3</td>
</tr>
<tr>
<td>EDCI 353</td>
<td>Early Childhood through Adolescent Education 3</td>
</tr>
<tr>
<td>INST 362</td>
<td>English as a Second Language Methods I 3</td>
</tr>
<tr>
<td>POLS 314</td>
<td>Interest Groups 3</td>
</tr>
<tr>
<td>RDNG 372</td>
<td>Reading and Writing across the Middle Grades Curriculum 3</td>
</tr>
<tr>
<td>Spring</td>
<td>15</td>
</tr>
<tr>
<td>EDCI 354</td>
<td>Early Childhood and Adolescent Curriculum and Lesson Design 3</td>
</tr>
<tr>
<td>INST 363</td>
<td>English as a Second Language Methods II 3</td>
</tr>
<tr>
<td>RDNG 468</td>
<td>Essential Foundations of Language and Literacy for All Learners 3</td>
</tr>
<tr>
<td>RDNG 472</td>
<td>Teaching Writing in Elementary and Middle Grade Classrooms 3</td>
</tr>
<tr>
<td>TEFB 371</td>
<td>Dynamics and Management in Multicultural/Inclusionary Learning Environments 3</td>
</tr>
<tr>
<td>Fourth Year</td>
<td>12</td>
</tr>
<tr>
<td>Fall</td>
<td>12</td>
</tr>
<tr>
<td>MEFB 452</td>
<td>Curriculum and Instruction for Middle Grades 3</td>
</tr>
<tr>
<td>MEFB 450</td>
<td>Social Studies Methods in the Middle Grades 3</td>
</tr>
<tr>
<td>RDNG 470</td>
<td>Reading/Language Arts Methods in Middle Grades Education 3</td>
</tr>
<tr>
<td>RDNG 490</td>
<td>Assessment in Reading Instruction in Middle Grades 3</td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours: 123**

American history elective to be chosen from HIST 352, HIST 355, HIST 356, HIST 359, HIST 361, HIST 362, HIST 363, HIST 374, HIST 412, HIST 421, HIST 455, HIST 456, HIST 460, HIST 461, HIST 473.

Government/political science elective must be satisfied by 3 hours chosen from POLS 314, POLS 315, POLS 316, POLS 317 or POLS 319, and 3 hours chosen from POLS 229, POLS 231, POLS 347, POLS 369 or POLS 415.

### Secondary Graduate Certification Program

**Secondary Graduate Certification Program**

This program is designed for those candidates who have completed the baccalaureate degree and desire initial certification at the secondary level. Candidates are admitted upon recommendation of departmental advisors and progress through summer, fall and spring as a cohort. The certification program requires completion of 21 graduate semester credit hours and the successful completion of appropriate State examinations. A full public school year internship and the opportunity to apply all coursework toward the Master of Education degree are unique features of this program. The candidate may, upon approval by the department and a cooperating school district, serve as an intern in a full-time salaried teacher of record position, in a part-time salaried teaching position, or as a paid substitute teacher. All candidates will serve a full public school year internship whether in a salaried or non-salaried position.

**Prerequisites**

Completion of the following prior to the first summer session:

1. Baccalaureate degree from an accredited institution with a GPR of 2.75.
2. Nine (9) semester credit hours
   - INST 210 Understanding Special Populations 9
   - TEFB 322 Teaching and Schooling in Modern Society
   - TEFB 324 Teaching Skills II
3. Coursework for one teaching field as approved by the teaching field advisor.
4. Pass the appropriate content area TExES exam.

**Course of Study for Secondary Certification at the Post-Baccalaureate Level**

Enrollment in the following courses is limited to candidates pursuing initial secondary certification in the post-baccalaureate program.

**First Year**

<table>
<thead>
<tr>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer</td>
</tr>
<tr>
<td>EDCI 611</td>
</tr>
</tbody>
</table>
College of Education and Human Development

Applied Learning in Science, Technology, Engineering and Mathematics (STEM) Minor

The College of Education and Human Development offers a minor in Applied Learning in Science, Technology, Engineering and Mathematics (STEM).

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEED 602</td>
<td>Contemporary Perspectives on Education</td>
<td>3</td>
</tr>
<tr>
<td>TEED 649</td>
<td>Instructional Strategies in Academic Specialties in Middle and Senior HS: Principles Applications</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Term Semester Credit Hours</td>
<td>9</td>
</tr>
<tr>
<td>Fall</td>
<td>TEED 682 Seminar</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>TEED 684 Professional Internship</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td>Term Semester Credit Hours</td>
<td>6-9</td>
</tr>
<tr>
<td>Spring</td>
<td>TEED 682 Seminar</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>TEED 684 Professional Internship</td>
<td>3-6</td>
</tr>
<tr>
<td></td>
<td>Term Semester Credit Hours</td>
<td>6-9</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours: 21-27

2 Candidates in a one-half time paid or non-paid internship may, with approval of an advisor, enroll in 3 credit hours of approved coursework, providing it does not interfere with the internship day.

Recommendation for Certification. Upon successful completion of the three prerequisite courses, the teaching field plan (minimum of 24 credit hours) during the summer, fall and spring semesters, a demonstrated competency in speech and technology, and passing scores on all State-required examinations, candidates will be recommended for certification.

NOTE: To complete the Master of Education degree, candidates will enroll in Teaching, Learning and Culture foundation courses and courses in their teaching field(s) as approved by their graduate advisory committee. The department also offers a “certification only” option for secondary certification. Contact the TLAC office for information about the accelerate option.

Secondary Certification Through Accelerate Online Program

This program is designed for those candidates who have completed the baccalaureate degree and desire initial certification at the secondary level. The program is designed to provide college graduates with a program of teacher preparation that can be completed in 12-18 months. The Accelerate Online program provides an individual with the flexibility of completing teacher certification through online instructional modules followed by a year-long paid internship in a secondary public school in Texas. Other information and additional program requirements can be obtained from Lynn Beason at lbeason@coe.tamu.edu or (979) 458-3968.

Secondary Certification Through the Aggie Teach Program

Contact the Aggie Teach advisor in the office of the Associate Dean, College of Science.

Secondary Certification Through the University Studies Program

Contact the TLAC Advising Office in Heaton Hall and the University Studies advisor in the Office of General Academic Programs in Hotard Hall.

University Studies Programs

The College of Education and Human Development offers degrees in University Studies. A University Studies degree differs from a traditional “major” in that it consists of a concentration and two minors of 15-18 hours each. The University Studies degree format was created to provide students the flexibility to combine areas of study that are of special interest.

Majors

- Bachelor of Science in University Studies, Child Professional Services Non-Certification Program (p. 256)
- Bachelor of Science in University Studies, Dance Concentration (p. 276)
- Bachelor of Science in University Studies, Sport Conditioning Concentration (p. 277)
- Bachelor of Science in University Studies, Sport Leadership Concentration (p. 278)
Dwight Look College of Engineering

Administrative Officers
Vice Chancellor and Dean of Engineering - M. Katherine Banks, Ph.D.
Executive Associate Dean - Nagamangala K. Anand, Ph.D.
Senior Associate Dean for Academic Affairs - Valerie E. Taylor, Ph.D.
Associate Dean for Undergraduate Programs - Prasad Enjeti, Ph.D.
Assistant Dean for Graduate Programs - John C. Criscione, Ph.D.
Senior Associate Dean for Research - Dimitris Lagoudas, Ph.D.
Associate Dean for Research - Costas Georghiades, D.Sc.
Assistant Dean for Finance - Michelle Mitchell, B.B.A.

General Statement
Engineering is the application of science and mathematics to the solution of relevant problems in our society. To a great extent, our current standard of living and high level of technology are due to the diligent and innovative efforts of engineers. In spite of the increasing expense of basic resources, modern engineers have succeeded in maintaining stable costs for a wide variety of goods, and at the same time have used their design and analysis abilities to introduce new products and technologies for the betterment of society.

The accelerating pace of industrial and technological developments has created an ever-increasing demand for highly qualified, professional engineers to maintain the momentum already achieved, and to extend and direct the course of these developments. The ever-expanding population and the increased demands for goods and services have imposed new challenges to provide effective solutions while minimizing unwanted side effects. Engineers recognize that all actions taken have their respective costs, and that solutions to long-standing societal problems are found in careful, thorough planning and study. With a pragmatic background in problem solving, engineers are perhaps best qualified to address society’s problems.

The complexities of the current environment are such that all resources must be used in the best possible manner. Thus, the Dwight Look College of Engineering, through its curricula, strives to educate and train engineers who have the breadth of vision to formulate and solve the problems of today and the future. It is expected that a student who conscientiously applies himself or herself and successfully completes an engineering program will be technically trained and socially educated, thereby being well prepared to make a significant contribution to the world in which he or she works.

The mission of the Dwight Look College of Engineering is to serve Texas, the nation and the global community by providing engineering graduates who are well founded in engineering fundamentals, instilled with the highest standards of professional and ethical behavior, and prepared to meet the complex technical challenges of society.

To achieve this mission the Dwight Look College of Engineering is committed to:

- ensuring an academic environment conducive to our faculties achieving the highest levels of academic and research excellence;
- building upon our traditional partnerships with industry, engineering practitioners and former students, to enhance our impact on the profession of engineering;
- encouraging excellence, innovation and cross-disciplinary initiatives in education and research;
- providing national and international leadership in undergraduate and graduate engineering education;
- becoming the engineering college of choice for the increasingly diverse citizenry of the state; and
- encouraging and supporting opportunities for our students to grow beyond their chosen disciplines by participation in ethics courses, leadership programs, study-abroad programs and research.

A student engineer can pursue any one of several degree plans, according to personal ambitions, interests and abilities. The student may choose the traditional BS degree and consider advanced research-oriented graduate programs leading to the MS and PhD degrees. Alternatively, the student may select the Doctor of Engineering program which is directed toward professional engineering.

Within the Dwight Look College of Engineering, the undergraduate programs in aerospace, biological and agricultural, biomedical, chemical, civil, computer, electrical, industrial, mechanical, nuclear, ocean, petroleum and radiological health engineering are accredited by the Engineering Accreditation Commission of ABET, www.abet.org. The electronic systems engineering technology program and the manufacturing and mechanical engineering technology program are accredited by the Engineering Technology Accreditation Commission of ABET, www.abet.org. The Computer Science program is accredited by the Computing Accreditation Commission of ABET, www.abet.org.

Entrance and Enrollment Requirements
The minimum requirements for entrance to the University are listed in the earlier pages of this catalog. Because of the importance of science and mathematics to engineering, high school students who aspire to a career in engineering are encouraged to take as many of these courses as possible. In particular, high school preparation should include four years of mathematics and four years of science emphasizing algebra, geometry, trigonometry, calculus, chemistry, physics and biology.

A critical step in an engineering education is proper individual placement in the first courses undertaken. The Dwight Look College of Engineering strongly recommends the following guidelines to students participating in the math advanced placement examinations in high school. Incoming engineering students can earn advanced placement (AP) credits for MATH 151 with a score of 4 on the Calculus AB exam or 3 on the BC exam, and for MATH 151 and MATH 152 by a score of 4 on the BC exam. While the student can accept these AP credits and enroll in the next course in the engineering mathematics sequence, the college recommends a more conservative decision about accepting advanced placement credits in math. Students who earn a 4 or 5 on the Calculus AB exam or a 3 or 4 on the BC exam are recommended to begin in MATH 151. Students who score a 5 on the Calculus BC exam are recommended to begin in MATH 151 or MATH 152. These conservative recommendations help ensure students have thoroughly mastered the content that is fundamental to the engineering curriculum. Students should discuss their choice with their assigned undergraduate academic advisor before registering for mathematics classes. New Student Conferences and associated Credit by
Examination tests provide information to advisors so that students begin at a level which may differ from the printed curriculum, but is appropriate to their aptitudes and background. All freshmen admitted into engineering are required to complete the Math Placement Exam (MPE) before the New Student Conferences and should review algebra, trigonometry and geometry prior to taking the MPE.

Because of the importance of computing in the disciplines housed within the Dwight Look College of Engineering, all entering students are required to possess a portable, network-ready personal computer capable of running software appropriate to their academic program, effective Fall 2014. Details about the personal computer needed to meet the requirement can be found on our website. No student will be denied admission to Texas A&M University based on an inability to purchase a computer.

Students who meet the University and college entrance requirements are admitted into the Dwight Look College of Engineering with a preference to a major field of study and receive a designation of “ENGE”. Students can apply to a major degree granting program after completing at least one semester and after learning about the different engineering disciplines from professional engineers. Before applying for entry to a major, students must complete a minimum of three courses that are applicable to their intended major degree program. The three courses are defined as follows: one engineering course, one math course, and one science course that are in the intended degree plan. The application process is competitive. Students must be accepted in a major by the end of their fourth semester or they will be blocked from further registration in the Dwight Look College of Engineering.

As an aid to making a decision, the freshman courses ENGR 111 and ENGR 112 introduce students to engineering problems from the various disciplines. In addition, students may attend departmental presentations, career fairs and other activities sponsored by student engineering professional societies. Academic Advisors at New Student Conferences will help students select courses to fit their preferences and abilities.

Transfer students will be admitted directly to a major degree granting program through the admissions process.

Freshman Curriculum

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/CHEM 111 and CHEM 102/CHEM 112 instead of CHEM 107/CHEM 117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met.

Fast Track Program

Each participating department in the Dwight Look College of Engineering has streamlined its program for Fast Track participants by substituting specific graduate courses for selected undergraduate offerings. Academically qualified students take these 600-level courses during their senior year, earning graduate credit while fulfilling undergraduate requirements through “credit by exam.” The individual department sets its own grade and exam requirements for earning dual credit. The department also establishes the maximum number of credit hours allowed for acceleration, usually five to seven.

Industry-University Cooperative Education

Cooperative education is a study-work plan of education in which a student alternates periods of attendance in college or university with periods of employment in industry related to his or her major. Students who choose this degree plan must complete at least 12 months of experience in order to receive the cooperative education certificate. The practice of engineering is an art which is learned through practice as well as in the classroom. The cooperative education program provides the education that can be achieved from practice by having the student work with professional engineers on the job. Consequently, the student who graduates with the cooperative education certificate has both the academic background and the practical experience to qualify him or her for more meaningful employment in the profession of engineering. The cooperative education work periods also provide an income for students that allows them to pay for their school expenses.

Those who wish additional information concerning this program should contact the Associate Director of Cooperative Education.

Advanced Study

Students who rank in the upper half of their undergraduate class should give serious consideration to developing their full intellectual potential in engineering by continuing with advanced studies at the graduate level. Two routes are available for students. The traditional master of science and doctor of philosophy degrees should be considered by students who wish to go into research fields. For those students interested in the practice of professional engineering, the master of engineering and doctor of engineering degrees should be given serious consideration.

The professional doctor of engineering degree was established in the fall of 1974 to fill a need for better-educated engineers in the practice of engineering. Students may enter this program at any time after they receive the bachelor’s degree in engineering by applying and being accepted to a departmental graduate program within the Dwight Look College of Engineering. Master’s level degrees require a minimum of one year of coursework after the bachelor’s, and the doctoral degrees require a minimum of an additional two years of coursework. The doctor of philosophy also requires a dissertation based on research by the student, and the doctor of engineering requires at least one year of internship experience in industry or government.

For more information concerning these programs, please refer to the Texas A&M University Graduate and Professional Catalog or contact the Office of the Dean of Engineering.

The engineering programs also provide a foundation for further education in the fields of medicine, law or business. An engineering background will prepare the individual to understand, contribute to and embrace technical advances in these fields.

The Texas A&M Engineering Academies

The Texas A&M Engineering Academies are co-enrollment programs between Texas A&M University, Dwight Look College of Engineering and selected two-year institutions. The Engineering Academies provide talented students an opportunity to pursue their engineering degree and take courses previously reserved for students admitted to the Dwight
Look College of Engineering. The admission process for the Engineering Academies is unique to each partner institution. Ultimately, the final offer of admission to the Academy is made by Texas A&M University.

Texas A&M Engineering Academy students are able to progress in engineering courses offered by the college, which allows participants an opportunity to graduate with their peers in the Dwight Look College of Engineering. The Engineering Academies are two year programs. At the conclusion of the second year, students who successfully complete program requirements will be fully admitted to Texas A&M University without an additional application process. An option to apply for early matriculation is offered to Engineering Academy students who have satisfied the required course and GPA requirements identified for the respective institution. This option is available as early as the first year, second semester. Program students may also apply for transfer admission to Texas A&M University via the transfer admission process before completion of the two-year program, however additional application fees will be assessed.

Eligible students receive financial aid based upon their combined credit hours from both institutions.

For more information, including specific requirements for each of the partner institutions, visit Texas A&M Engineering Academies (https://engineering.tamu.edu/academies).

**Majors**

**Dwight Look College of Engineering**
- Bachelor of Science in Biological and Agricultural Engineering (p. 293)

**Department of Aerospace Engineering**
- Bachelor of Science in Aerospace Engineering (p. 297)

**Department of Biomedical Engineering**
- Bachelor of Science in Biomedical Engineering (p. 299)

**Artie McFerrin Department of Chemical Engineering**
- Bachelor of Science in Chemical Engineering (p. 303)

**Zachry Department of Civil Engineering**
- Bachelor of Science in Civil Engineering (p. 308)
- Bachelor of Science in Civil Engineering, Coastal and Ocean Engineering Track (p. 310)
- Bachelor of Science in Civil Engineering, Construction Engineering and Management Track (p. 311)
- Bachelor of Science in Civil Engineering, Environmental Engineering Track (p. 313)
- Bachelor of Science in Civil Engineering, General Civil Engineering Track (p. 315)
- Bachelor of Science in Civil Engineering, Geotechnical Engineering Track (p. 317)
- Bachelor of Science in Civil Engineering, Structural Engineering Track (p. 319)
- Bachelor of Science in Civil Engineering, Transportation Engineering Track (p. 321)
- Bachelor of Science in Civil Engineering, Water Resources Engineering Track (p. 323)
- Bachelor of Science in Ocean Engineering (p. 324)

**Department of Computer Science and Engineering**
- Bachelor of Science in Computer Engineering, Computer Science Track (p. 327)
- Bachelor of Science in Computer Science (p. 328)

**Department of Electrical and Computer Engineering**
- Bachelor of Science in Computer Engineering, Electrical Engineering Track (p. 332)
- Bachelor of Science in Electrical Engineering (p. 334)

**Department of Engineering Technology and Industrial Distribution**
- Bachelor of Science in Electronic Systems Engineering Technology (p. 337)
- Bachelor of Science in Engineering Technology, Manufacturing and Mechanical Engineering Option (p. 338)
- Bachelor of Science in Industrial Distribution (p. 339)

**Department of Industrial and Systems Engineering**
- Bachelor of Science in Industrial Engineering (p. 342)

**Department of Mechanical Engineering**
- Bachelor of Science in Mechanical Engineering (p. 348)

**Department of Nuclear Engineering**
- Bachelor of Science in Nuclear Engineering (p. 351)
- Bachelor of Science in Radiological Health Engineering (p. 353)

**Harold Vance Department of Petroleum Engineering**
- Bachelor of Science in Petroleum Engineering (p. 356)

**Minors**

**Department of Aerospace Engineering**
- Aerospace Engineering Minor (p. 298)

**Department of Biomedical Engineering**
- Biomedical Engineering Minor (p. 300)

**Artie McFerrin Department of Chemical Engineering**
- Chemical Engineering Minor (p. 305)

**Department of Computer Science and Engineering**
- Computer Science Minor (p. 329)
Department of Electrical and Computer Engineering
• Electrical Engineering Minor (p. 335)

Department of Engineering Technology and Industrial Distribution
• Embedded Systems Integration Minor (p. 341)

Department of Industrial and Systems Engineering
• Industrial Engineering Minor (p. 343)

Department of Materials Science and Engineering
• Materials Science and Engineering Minor (p. 345)

Department of Nuclear Engineering
• Nuclear Engineering Minor (p. 354)
• Radiological Health Engineering Minor (p. 354)

Harold Vance Department of Petroleum Engineering
• Petroleum Engineering Minor (p. 357)

Certificates
The Dwight Look College of Engineering has designed the following certificate programs to offer ambitious students the opportunity to go beyond the traditional curriculum and gain specific knowledge in a concentration area. Students are required to consult with their academic advisor prior to submitting an application for a certificate. Enrolling and being accepted into a certificate program does not guarantee registration into required courses. Each certificate, with the exception of the Business Management Certificate, will be recognized on the candidate’s transcript. A coordinator reviews each student’s coursework via a certificate worksheet and requirements met prior to certification. Certificate coordinators are given the discretion to determine the eligibility of students in other colleges and/or majors to pursue Dwight Look College of Engineering certificates. For specific information on each certificate available, visit the Dwight Look College of Engineering website.

Dwight Look College of Engineering
• Business Management Certificate for Engineering Students (http://catalog.tamu.edu/undergraduate/engineering/business-management-certificate)
• Engineering Honors Certificate (http://catalog.tamu.edu/undergraduate/engineering/honors-certificate)
• Engineering Project Management Certificate (http://catalog.tamu.edu/undergraduate/engineering/project-management-certificate)
• International Engineering Certificate (http://catalog.tamu.edu/undergraduate/engineering/international-certificate)
• Polymer Specialty Certificate (http://catalog.tamu.edu/undergraduate/engineering/polymer-specialty-certificate)
• Safety Engineering Certificate (http://catalog.tamu.edu/undergraduate/engineering/safety-certificate)

Department of Biomedical Engineering
• Engineering Therapeutics Manufacturing Certificate (p. 301)
• Quality Engineering for Regulated Medical Technologies Certificate (p. 301)

Department of Industrial and Systems Engineering
• Data Center Operations Engineering Certificate (p. 343)
• Engineering Systems Management Certificate (p. 343)

Harold Vance Department of Petroleum Engineering
• Energy Engineering Certificate (p. 357)

Masters
Dwight Look College of Engineering
• Master of Engineering in Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/interdepartmental-degree-programs/meng)
• Master of Science in Interdisciplinary Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/interdepartmental-degree-programs/ms)
• Master of Science in Safety Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/interdepartmental-degree-programs/safety-engineering-ms)

Department of Aerospace Engineering
• Master of Engineering in Aerospace Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/aerospace/meng)
• Master of Science in Aerospace Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/aerospace/ms)

Department of Biomedical Engineering
• Master of Engineering in Biomedical Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/biomedical/meng)
• Master of Science in Biomedical Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/biomedical/ms)

Artie McFerrin Department of Chemical Engineering
• Master of Engineering in Chemical Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/chemical/meng)
• Master of Science in Chemical Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/chemical/ms)

Zachry Department of Civil Engineering
• Master of Engineering in Civil Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/civil/meng)
• Master of Engineering in Ocean Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/civil/ocean-meng)
• Master of Science in Civil Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/civil/ms)
• Master of Science in Ocean Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/civil/ocean-ms)

Department of Computer Science and Engineering
• Master of Computer Science in Computer Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/computer-science/mcs)
• Master of Engineering in Computer Engineering, Computer Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/computer-science/engineering-meng)
• Master of Science in Computer Engineering, Computer Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/computer-science/engineering-ms)
• Master of Science in Computer Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/computer-science/ms)

Department of Electrical and Computer Engineering
• Master of Engineering in Computer Engineering, Electrical Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/electrical-computer/computer-meng)
• Master of Engineering in Electrical Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/electrical-computer/electrical-meng)
• Master of Science in Computer Engineering, Electrical Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/electrical-computer/engineering-ms)
• Master of Science in Electrical Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/electrical-computer/electrical-ms)

Department of Engineering Technology and Industrial Distribution
• Master of Industrial Distribution in Industrial Distribution (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/technology-industrial-distribution/mid)

Department of Industrial and Systems Engineering
• Master of Engineering in Industrial Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/industrial-systems/meng)
• Master of Science in Industrial Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/industrial-systems/ms)

Department of Materials Science and Engineering
• Master of Engineering in Materials Science and Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/materials-science/engineering/materials-science/meng)
• Master of Science in Materials Science and Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/materials-science/engineering/materials-science/ms)

Department of Mechanical Engineering
• Master of Engineering in Mechanical Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/mechanical/engineering/mechanical-meng)
• Master of Science in Mechanical Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/mechanical/engineering/mechanical-ms)

Department of Nuclear Engineering
• Master of Engineering in Nuclear Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/nuclear/engineering/nuclear-meng)
• Master of Science in Health Physics (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/nuclear/health-physics-ms)
• Master of Science in Nuclear Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/nuclear/engineering/nuclear/ms)

Harold Vance Department of Petroleum Engineering
• Master of Engineering in Petroleum Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/petroleum/engineering/petroleum-meng)
• Master of Science in Petroleum Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/petroleum/engineering/petroleum-ms)

Doctoral
Dwight Look College of Engineering
• Doctor of Engineering in Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/interdepartmental-degree-programs/deng)
• Doctor of Philosophy in Interdisciplinary Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/interdepartmental-degree-programs/phd)

Department of Aerospace Engineering
• Doctor of Philosophy in Aerospace Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/aerospace/phd)

Department of Biomedical Engineering
• Doctor of Philosophy in Biomedical Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/biomedical/phd)
Artie McFerrin Department of Chemical Engineering

- Doctor of Philosophy in Chemical Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/chemical/phd)

Zachry Department of Civil Engineering

- Doctor of Philosophy in Civil Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/civil/phd)
- Doctor of Philosophy in Ocean Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/civil/ocean-phd)

Department of Computer Science and Engineering

- Doctor of Philosophy in Computer Engineering, Computer Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/computer-science/engineering-phd)
- Doctor of Philosophy in Computer Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/computer-science/phd)

Department of Electrical and Computer Engineering

- Doctor of Philosophy in Computer Engineering, Electrical Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/electrical-computer/computer-phd)
- Doctor of Philosophy in Electrical Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/electrical-computer/electrical-phd)

Department of Industrial and Systems Engineering

- Doctor of Philosophy in Industrial Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/industrial-systems/phd)

Department of Materials Science and Engineering

- Doctor of Philosophy in Materials Science and Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/materials-science/phd)

Department of Mechanical Engineering

- Doctor of Philosophy in Mechanical Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/mechanical/phd)

Department of Nuclear Engineering

- Doctor of Philosophy in Nuclear Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/nuclear/phd)

Harold Vance Department of Petroleum Engineering

- Doctor of Philosophy in Petroleum Engineering (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/engineering/petroleum/phd)

Biological and Agricultural Engineering - BS

The biological and agricultural engineering program develops graduates who can pursue engineering careers in industry, academia, consulting or government. The curriculum is designed:

- to produce graduates who are prepared to become practicing biological and agricultural engineers, many of whom will become registered professional engineers;
- to produce graduates to serve the engineering needs of clientele in environmental and natural resources, machine systems, food processing, bioprocessing, and agricultural production and processing; and
- to produce graduates who continue to be engaged in professional development.

Students learn to apply fundamental knowledge of biological and physical sciences, mathematics, and engineering principles to formulate and solve engineering problems. Engineering design is integrated throughout the curriculum, along with opportunities to develop communication, learning, and teamwork skills, culminating in a capstone design experience. Electives in the curriculum allow the student to specialize in one of the following areas:

- Environmental and Natural Resources Engineering—design and management of systems affecting soil, water, and air resources.
- Renewable Energy Engineering—design and development of biomass, wind and solar energy systems.
- Food and Bioprocess Engineering—design and development of systems for processing and handling of food and agricultural products and processes involving cells, enzymes, or other biological components.
- Machine Systems Engineering—design and development of machines and machine systems for food, feed and fiber production and processing.

Students select courses with the assistance of faculty advisors in an individualized advising system. Faculty members also assist with professional development and job placement for students.

The biological and agricultural engineering program is jointly administered by the College of Agriculture and Life Sciences and the Dwight Look College of Engineering, and the curriculum is fully accredited by the Engineering Accreditation Commission of ABET, Inc., www.abet.org. The department is one of the largest in North America and is consistently ranked as one of the top programs in the nation.

For graduates to become successful practicing biological and agricultural engineers, students need to acquire a set of skills, knowledge, and behaviors as they progress through the curriculum. We have established the following program outcomes outlining what students are expected to know and be able to do upon completion of the curriculum. At the time of graduation, students should have:
1. an ability to apply knowledge of mathematics, science and engineering;
2. an ability to design and conduct experiments, as well as to analyze and interpret data;
3. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
4. an ability to function on multidisciplinary teams;
5. an ability to identify, formulate, and solve engineering problems;
6. an understanding of professional and ethical responsibility;
7. an ability to communicate effectively;
8. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
9. a recognition of the need for, and an ability to engage in life-long learning;
10. a knowledge of contemporary issues;
11. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**Program Requirements**

<table>
<thead>
<tr>
<th>First Year</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
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<tr>
<td>CHEM 107</td>
<td>General Chemistry for Engineering Students</td>
</tr>
<tr>
<td>CHEM 117</td>
<td>General Chemistry for Engineering Students Laboratory</td>
</tr>
<tr>
<td>ENGR 111</td>
<td>Foundations of Engineering I</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
</tr>
<tr>
<td>PHYS 218</td>
<td>Mechanics</td>
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<tbody>
<tr>
<td>BIOL 113</td>
<td>Essentials in Biology</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
</tr>
<tr>
<td>ENGR 112</td>
<td>Foundations of Engineering II</td>
</tr>
<tr>
<td>MATH 152</td>
<td>Engineering Mathematics II</td>
</tr>
<tr>
<td>PHYS 208</td>
<td>Electricity and Optics</td>
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<td><strong>Fall</strong></td>
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<tr>
<td>CHEM 222</td>
<td>Elements of Organic and Biological Chemistry</td>
</tr>
<tr>
<td>MATH 251</td>
<td>Engineering Mathematics III</td>
</tr>
<tr>
<td>MEEN 221</td>
<td>Statics and Particle Dynamics</td>
</tr>
<tr>
<td>MEEN 222</td>
<td>Materials Science</td>
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<tr>
<td>Government/Political science (p. 23)</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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<tbody>
<tr>
<td>BAEN 201</td>
<td>Analysis of Biological and Agricultural Engineering Problems</td>
</tr>
<tr>
<td>BAEN 301</td>
<td>Biological and Agricultural Engineering Fundamentals I</td>
</tr>
<tr>
<td>BAEN 320</td>
<td>Engineering Thermodynamics</td>
</tr>
<tr>
<td>CVEN 305</td>
<td>Mechanics of Materials</td>
</tr>
<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
</tr>
<tr>
<td>MATH 308</td>
<td>Differential Equations</td>
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<th>Third Year</th>
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<tbody>
<tr>
<td><strong>Fall</strong></td>
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</tr>
<tr>
<td>BAEN 302</td>
<td>Biological and Agricultural Engineering Fundamentals II</td>
</tr>
<tr>
<td>BAEN 340</td>
<td>Fluid Mechanics</td>
</tr>
<tr>
<td>BAEN 354</td>
<td>Engineering Properties of Biological Materials</td>
</tr>
<tr>
<td>BAEN 375</td>
<td>Design Fundamentals for Agricultural Machines and Structures</td>
</tr>
<tr>
<td>ECEN 215</td>
<td>Principles of Electrical Engineering</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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<table>
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<th>Spring</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>BAEN 365</td>
<td>Unit Operations for Biological and Agricultural Engineering</td>
</tr>
<tr>
<td>BAEN 366</td>
<td>Transport Processes in Biological Systems</td>
</tr>
<tr>
<td>BAEN 370</td>
<td>Measurement and Control of Biological Systems and Agricultural Processes</td>
</tr>
<tr>
<td>American history (p. 23)</td>
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<tr>
<td>Government/Political science (p. 23)</td>
<td>3</td>
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<tr>
<td>Mathematics (p. 860)</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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<tr>
<td><strong>Fall</strong></td>
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<tr>
<td>BAEN 479</td>
<td>Biological and Agricultural Engineering Design I</td>
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<tr>
<td>ENGR 482/PHIL 482 Ethics and Engineering</td>
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<tr>
<td>BAEN elective (p. 647)</td>
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<td>ENGR elective (p. 761)</td>
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<tr>
<td>Social and behavioral sciences (p. 23)</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>BAEN 480</td>
<td>Biological and Agricultural Engineering Design II</td>
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<tr>
<td>BAEN elective (p. 647)</td>
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<tr>
<td>American history (p. 23)</td>
<td>3</td>
</tr>
<tr>
<td>Creative arts (p. 22)</td>
<td>3</td>
</tr>
<tr>
<td>Technical elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Term Semester Credit Hours</strong></td>
<td>15</td>
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</tbody>
</table>

| Total Semester Credit Hours: | 127 |

1. Entering students will normally be given a placement test in mathematics. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.
A grade of C or better is required for all math, science, and engineering courses.

**Department of Aerospace Engineering**

Aerospace Engineering is a complex, rapidly changing field that includes aerodynamics, structures and materials, propulsion, dynamics and control, and astrodynamics. The primary application of aerospace engineering is to design and develop flight vehicles, such as aircraft, missiles, spacecraft and satellites. Aerospace engineering is also important and applicable to other vehicles and systems, such as rotorcraft, submarines, automobiles, wind turbines, advanced robotics, re-entry vehicles, exotic materials and computational simulations.

The mission of the Aerospace Engineering program is

1. to provide students with a quality undergraduate and graduate education for the State of Texas and the nation through an innovative educational program;
2. to advance the science and aerospace engineering knowledge base through basic and applied research, inventions, technologies and solutions to aerospace problems; and
3. to serve the aerospace engineering profession by preparing leaders for leadership in the creation, design and operation of the next generation aerospace systems.

To achieve this mission, the educational objectives established by the Aerospace Engineering undergraduate program are to produce graduates whose expected accomplishments within three to five years of graduation are

1. to have successful careers in industry, private practice, or government, or have pursued advanced graduate studies;
2. to be skilled practitioners who apply their knowledge and skills to solve relevant engineering problems in the aerospace or a related profession; and
3. to function well in teams, communicate well, continue enhancing their professional competence, and understand the impact of engineering solutions.

To carry out these educational objectives, the goals of the program are

1. using a high quality faculty, to provide a comprehensive aerospace engineering education that develops in students the fundamental skills necessary for the design, synthesis, analysis and research development of aircraft, spacecraft and other high technology flight systems; and
2. to prepare students for the aerospace engineering profession and related fields by developing the attributes needed, so that they can contribute successfully to society and to the engineering profession now and in the future.
Chamitoff, Gregory E, Professor Of The Practice
Aerospace Engineering
PhD, Massachusetts Institute of Technology, 1992

Cizmas, Paul G, Professor
Aerospace Engineering
PhD, Duke University, 1995

Donzis, Diego A, Associate Professor
Aerospace Engineering
PhD, Georgia Institute of Technology, 2007

Elmendorf, Harry M, Associate Professor Of The Practice
Aerospace Engineering
BS, Texas A&M University, 1979

Girimaji, Sharath S, Professor
Aerospace Engineering
PhD, Cornell University, 1990

Hurtado, John E, Professor
Aerospace Engineering
PhD, Texas A&M University, 2009

Hyland, David C, Professor
Aerospace Engineering
DSc, Massachusetts Institute of Technology, 1974

Junkins, John L, Distinguished Professor
Aerospace Engineering
PhD, University of California, Los Angeles, 1969

Kanipe, David B, Associate Professor Of The Practice
Aerospace Engineering
MS, Texas A&M University, 1971

Karpets, Adonios N, Associate Professor
Aerospace Engineering
PhD, Yale University, 1998

Kinra, Vikram K, Professor
Aerospace Engineering
PhD, Brown University, 1975

Lagoudas, Dimitris C, Professor
Aerospace Engineering
PhD, Lehigh University, 1986

Le Graverend, Jean-Briac B, Assistant Professor
Aerospace Engineering

Lutz, Wayne A, Associate Professor Of The Practice
Aerospace Engineering
MS, University of Southern California, 1984

Mishra, Aashwin A, Lecturer
Aerospace Engineering
PhD, Texas A&M University, 2014

Moble, Benedict, Assistant Professor
Aerospace Engineering
PhD, University of Maryland, 2010

Mortari, Daniele, Professor
Aerospace Engineering
PhD, University La Sapienza of Rome, 1980

Naraghi, Mohammad, Assistant Professor
Aerospace Engineering
PhD, University of Illinois at Urbana-Champaign, 2009

Pollock, Thomas C, Associate Professor
Aerospace Engineering
PhD, University of Virginia, 1977

Redinotis, Othon K, Professor
Aerospace Engineering
PhD, Virginia Tech, 1992

Reed, Helen L, Professor
Aerospace Engineering
PhD, Virginia Tech, 1981

Richard, Jacques C, Senior Lecturer
Aerospace Engineering
PhD, Rensselaer University, 1989

Saric, William S, Distinguished Professor
Aerospace Engineering
PhD, Illinois Institute of Technology, 1968

Strganac, Thomas W, Professor
Aerospace Engineering
PhD, Virginia Tech, 1987

Strouboulis, Theofanis, Professor
Aerospace Engineering
PhD, University of Texas, Austin, 1986

Talreja, Ramesh R, Professor
Aerospace Engineering
PhD, The Technical University of Denmark, 1985

Vadali, Srinivas R, Professor
Aerospace Engineering
PhD, Virginia Tech, 1983

Valasek, John L, Professor
Aerospace Engineering
PhD, University of Kansas, 1995

Whitcomb, John D, Professor
Aerospace Engineering
PhD, Virginia Tech, 1988

White, Edward B, Associate Professor
Aerospace Engineering
PhD, Arizona State University, 2000

**Majors**

- Bachelor of Science in Aerospace Engineering (p. 297)

**Minors**

- Aerospace Engineering Minor (p. 298)
**Aerospace Engineering - BS**

Coursework in aerodynamics, structures and materials, propulsion, and dynamics and control provide a strong fundamental basis for advanced study and specialization, while technical electives offer a concentration of study in fields of special interest. Design philosophy and practice are developed throughout the curriculum to relate analysis to aerospace engineering design. The design of aerospace system components is particularly emphasized in the junior- and senior-level courses. A senior-level two-semester design sequence, involving specific goals, objectives, and constraints, integrates analysis and design tools and requires students working in small teams to design, build, test, and even fly an aerospace system, such as an aircraft, rocket, or spacecraft. Application of modern engineering and computational tools is required and emphasized in all courses.

**Program Requirements**

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

### University Core Curriculum (p. 19)

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Spring</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Term</td>
<td>16</td>
<td></td>
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### First Year

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<tr>
<th>Fall</th>
<th>Semester Credit Hours</th>
<th>Credit</th>
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<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 111</td>
<td>Foundations of Engineering I</td>
<td>2</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 218</td>
<td>Mechanics</td>
<td>4</td>
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<td>University Core Curriculum (p. 19)</td>
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### Second Year

<table>
<thead>
<tr>
<th>Fall</th>
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<tbody>
<tr>
<td>AERO 201</td>
<td>Introduction to Flight</td>
<td>3</td>
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<tr>
<td>AERO 212</td>
<td>Introduction to Aerothermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 210 or</td>
<td>Technical and Business Writing or</td>
<td>3</td>
</tr>
<tr>
<td>COMM 205</td>
<td>Communication for Technical Professions</td>
<td>3</td>
</tr>
<tr>
<td>MATH 251</td>
<td>Engineering Mathematics III</td>
<td>3</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
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</tr>
</tbody>
</table>

### Third Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Semester Credit Hours</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERO 301</td>
<td>Theoretical Aerodynamics</td>
<td>3</td>
</tr>
<tr>
<td>AERO 302</td>
<td>Aerospace Engineering Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>AERO 304</td>
<td>Aerospace Structural Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>AERO 310</td>
<td>Aerospace Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
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### Fourth Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Semester Credit Hours</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERO 303</td>
<td>High Speed Aerodynamics</td>
<td>3</td>
</tr>
<tr>
<td>AERO 306</td>
<td>Aerospace Structural Analysis II</td>
<td>3</td>
</tr>
<tr>
<td>AERO 321</td>
<td>Dynamics of Aerospace Vehicles</td>
<td>3</td>
</tr>
<tr>
<td>AERO 351</td>
<td>Aerothermodynamics and Propulsion</td>
<td>3</td>
</tr>
</tbody>
</table>
### University Core Curriculum (p. 19) <sup>3</sup>  

#### Fourth Year  

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>AERO 401</td>
<td>Aerospace Vehicle Design I</td>
<td>5</td>
</tr>
<tr>
<td>AERO 413</td>
<td>Aerospace Materials Science</td>
<td>3</td>
</tr>
<tr>
<td>AERO 423</td>
<td>Orbital Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>AERO 430 or MATH 401</td>
<td>Numerical Simulation or Advanced Engineering Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AERO 405</td>
<td>Aerospace Structural Design</td>
<td></td>
</tr>
<tr>
<td>AERO 417</td>
<td>Aerospace Propulsion</td>
<td></td>
</tr>
<tr>
<td>AERO 426</td>
<td>Space System Design</td>
<td></td>
</tr>
<tr>
<td>AERO 428</td>
<td>Electromagnetic Sensing for Space-Borne Imaging</td>
<td></td>
</tr>
<tr>
<td>AERO 472</td>
<td>Airfoil and Wing Design</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>AERO 402</td>
<td>Aerospace Vehicle Design II</td>
<td>5</td>
</tr>
<tr>
<td>AERO 422</td>
<td>Active Controls for Aerospace Vehicles</td>
<td>3</td>
</tr>
<tr>
<td>AERO 452</td>
<td>Heat Transfer and Viscous Flows</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 482/PHIL 482</td>
<td>Ethics and Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Select two of the following:</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>AERO 404</td>
<td>Mechanics of Advanced Aerospace Structures</td>
<td></td>
</tr>
<tr>
<td>AERO 405</td>
<td>Aerospace Structural Design</td>
<td></td>
</tr>
<tr>
<td>AERO 406</td>
<td>Polymer Nanocomposites and their Applications</td>
<td></td>
</tr>
<tr>
<td>AERO 417</td>
<td>Aerospace Propulsion</td>
<td></td>
</tr>
<tr>
<td>AERO 419</td>
<td>Chemical Rocket Propulsion</td>
<td></td>
</tr>
<tr>
<td>AERO 420</td>
<td>Aeroelasticity</td>
<td></td>
</tr>
<tr>
<td>AERO 424</td>
<td>Spacecraft Attitude Dynamics and Control</td>
<td></td>
</tr>
<tr>
<td>AERO 425</td>
<td>Flight Test Engineering</td>
<td></td>
</tr>
<tr>
<td>AERO 426</td>
<td>Space System Design</td>
<td></td>
</tr>
<tr>
<td>AERO 428</td>
<td>Electromagnetic Sensing for Space-Borne Imaging</td>
<td></td>
</tr>
<tr>
<td>AERO 430</td>
<td>Numerical Simulation</td>
<td></td>
</tr>
<tr>
<td>AERO 435</td>
<td>Aerothermochemistry</td>
<td></td>
</tr>
<tr>
<td>AERO 440</td>
<td>Cockpit Systems and Displays</td>
<td></td>
</tr>
<tr>
<td>AERO 445</td>
<td>Vehicle Management Systems</td>
<td></td>
</tr>
<tr>
<td>AERO 472</td>
<td>Airfoil and Wing Design</td>
<td></td>
</tr>
<tr>
<td>AERO 489</td>
<td>Special Topics in...</td>
<td></td>
</tr>
<tr>
<td>ECEN 421</td>
<td>Digital Control Systems</td>
<td></td>
</tr>
<tr>
<td>ENGR 385</td>
<td>Problems for Co-Op Students</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Semester Credit Hours</strong></td>
<td></td>
<td>95</td>
</tr>
</tbody>
</table>

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### Aerospace Engineering - Minor  

The Department of Aerospace Engineering offers a minor in Aerospace Engineering.

#### Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERO 301</td>
<td>Theoretical Aerodynamics</td>
<td>3</td>
</tr>
<tr>
<td>AERO 304</td>
<td>Aerospace Structural Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>AERO 310</td>
<td>Aerospace Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>AERO 303</td>
<td>High Speed Aerodynamics</td>
<td>3</td>
</tr>
<tr>
<td>AERO 306</td>
<td>Aerospace Structural Analysis II</td>
<td>3</td>
</tr>
<tr>
<td>AERO 321</td>
<td>Dynamics of Aerospace Vehicles</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Semester Credit Hours</strong></td>
<td></td>
<td>18</td>
</tr>
</tbody>
</table>

#### Additional Requirements

- Overall GPR > 2.50 when entering the minor field of study.
- Major GPR > 2.50 when entering the minor field of study.
- Must earn C or higher to count as a minor field of study.

#### Prerequisites

- Approval to pursue the minor from Aerospace; completion of CBKs with a C or better.

### Department of Biomedical Engineering

The objectives of the biomedical engineering program are to produce high-quality graduates with a broad-based education in engineering, life sciences and natural sciences; who:

1. are well prepared for further graduate studies, careers in the biomedical or biotechnology industries or entry into medical or other professional schools;
2. will make significant contributions in biomedical industries, medicine and other sectors;
3. will apply acquired knowledge appropriately, work professionally with others, effectively communicate ideas and technical information and continue to learn and improve their knowledge base and skills.

These objectives are met through a modern and comprehensive curriculum taught by a well-prepared, professionally active and dedicated faculty. In addition, the program actively supports professional development among the students through individual study and research opportunities, cooperative education and internships, and student society activities. These goals are measured by the success of the graduates in finding rewarding professional employment, and by admission to respected graduate and professional schools.

Design is an important part of biomedical engineering and design skills are emphasized throughout the curriculum, beginning in the freshman year, and culminating in the two-semester senior design course sequence that requires application of a wide range of engineering methods to a focused design project. Other courses in biomedical engineering and in supporting disciplines include examples of the application of the principles to design, as well as specific design exercises. The Biomedical Engineering curriculum is accredited by the Engineering Accreditation Commission of ABET, www.abet.org.

---

<sup>5</sup> Three design options are available - Aircraft, Rocket, or Spacecraft Design. A two-semester sequence is required.

### Total Program Hours 128
Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

**Faculty**

Alge, Daniel L, Assistant Professor
Biomedical Engineering
PhD, Purdue University, 2010

Applegate, Brian E, Associate Professor
Biomedical Engineering
PhD, Ohio State University, 2000

Brewer, Maurice A, Professor Of The Practice
Biomedical Engineering
BS, Texas A&M University, 1977

Cosgriff-Hernandez, Elizabeth M, Associate Professor
Biomedical Engineering
PhD, Case Western Reserve University, 2005

Cote, Gerard L, Professor
Biomedical Engineering
PhD, University of Connecticut, 1990

Cricione, John C, Associate Professor
Biomedical Engineering
PhD, John Hopkins University, 2005

Gaharwar, Akhilesh K, Assistant Professor
Biomedical Engineering
PhD, Purdue University, 2011

Gibbs, Holly C, Lecturer
Biomedical Engineering
PhD, Texas A&M University, 2015

Grunlan, Melissa A, Associate Professor
Biomedical Engineering
PhD, University of South Carolina, 2004

Hanks, John P, Professor Of The Practice
Biomedical Engineering
MS, University of Texas, Austin, 1989

Hwang, Wonmuk, Associate Professor
Biomedical Engineering
PhD, Boston University, 2001

Jo, Javier A, Associate Professor
Biomedical Engineering
PhD, University of Southern California, 2002

Kaunas, Roland R, Associate Professor
Biomedical Engineering
PhD, University of California, San Diego, 2003

Madigan, Michael L, Professor
Biomedical Engineering
PhD, Virginia Commonwealth University, 2001

McDougall, Mary P, Associate Professor
Biomedical Engineering
PhD, Texas A&M University, 2004

McShane, Michael J, Professor
Biomedical Engineering
PhD, Texas A&M University, 1999

Meissner, Kenith E, Tees Research Professor
Biomedical Engineering
PhD, University of Arizona, 1994

Ober, Raimund J, Professor
Biomedical Engineering
PhD, Cambridge University, 1987

Yakovlev, Vladislav V, Professor
Biomedical Engineering
PhD, Moscow State University, 1990

Yeh, Alvin T, Associate Professor
Biomedical Engineering
PhD, University of California, Berkeley, 2000

**Majors**

- Bachelor of Science in Biomedical Engineering (p. 299)

**Minors**

- Biomedical Engineering Minor (p. 300)

**Certificates**

- Engineering Therapeutics Manufacturing Certificate (p. 301)
- Quality Engineering for Regulated Medical Technologies Certificate (p. 301)

**Biomedical Engineering - BS**

The curriculum in biomedical engineering involves the development and application of engineering science and technology for living and medical systems. Although there have been individuals working in biomedical engineering for centuries, today's modern educational programs are specifically designed to prepare engineers for this challenging field. The curriculum described is broadly based around a basic core of courses developed to prepare students for team involvement with other engineers and with physicians and life scientists in working to solve a wide array of biological and medical problems. Elective courses are included to accommodate individual student specialty interests. Students interested in medical school can meet admission prerequisites through slight modifications and additions to the curriculum.

**Program Requirements**

**First Year**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td></td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric  1</td>
</tr>
<tr>
<td>ENGR 111</td>
<td>Foundations of Engineering 1</td>
</tr>
<tr>
<td>Maitland, Duncan J, Professor</td>
<td></td>
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<tr>
<td>Biomedical Engineering</td>
<td></td>
</tr>
<tr>
<td>PhD, Northwestern University, 1995</td>
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</tr>
<tr>
<td>Course</td>
<td>Title</td>
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<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
</tr>
<tr>
<td>PHYS 218</td>
<td>Mechanics 1</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Spring**

Select one of the following: 4

- CHEM 101 | Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory I | 4 |
- CHEM 107 | General Chemistry for Engineering Students and General Chemistry for Engineering Students Laboratory | 4 |
- ENGR 112 | Foundations of Engineering II | 2 |
- MATH 152 | Engineering Mathematics II | 4 |
- PHYS 208 | Electricity and Optics 1 | 4 |
- University Core Curriculum (p. 19) | 3 | 3 |

**Second Year**

**Fall**

- BMEN 101 | Introduction to Biomedical Engineering | 1 |
- BMEN 207 | Computing for Biomedical Engineering | 3 |
- CHEM 102 | Fundamentals of Chemistry II and Fundamentals of Chemistry Laboratory II | 4 |
- ENGL 203 or ENGL 210 | Writing about Literature or Technical and Business Writing | 3 |
- MATH 251 | Engineering Mathematics III | 3 |
- VTPP 434 | Physiology for Bioengineers I | 4 |

**Spring**

- BMEN 211 | Biomedical Applications of Circuits, Signals and Systems | 3 |
- BMEN 253 | Medical Device Design I | 1 |
- CHEM 227 | Organic Chemistry I | 3 |
- MATH 308 | Differential Equations | 3 |
- VTPP 435 | Physiology for Bioengineers II | 4 |
- University Core Curriculum (p. 19) | 3 | 3 |

**Third Year**

**Fall**

- BMEN 305 | Bioinstrumentation | 1 |
- BMEN 321 | Biomedical Electronics | 3 |
- BMEN 341 | Biofluid Mechanics | 3 |
- BMEN 343 | Introduction to Biomaterials | 3 |
- BMEN 350 | Statistics for Biomedical Engineering | 3 |
- University Core Curriculum (p. 19) | 3 | 3 |

**Spring**

- BMEN 344 | Biological Responses to Medical Devices | 3 |
- BMEN 345 | Biomaterials Lab | 1 |
- BMEN 353 | Medical Device Design II | 1 |
- BMEN 361 | Biosolid Mechanics | 3 |
- BMEN 420 | Medical Imaging | 3 |
- Technical elective 5 | | 3 |
- University Core Curriculum (p. 19) | 3 | 3 |

**Fourth Year**

**Fall**

- BMEN 453 | Analysis and Design Project I | 2 |
- BMEN 465 | Biomechanics Experiential Learning Lab | 1 |
- BMEN 468 | Advanced Biomechanics | 3 |
- Technical elective 5 | | 6 |
- University Core Curriculum (p. 19) | 3 | 3 |

**Spring**

- BMEN 450 | Case Studies | 1 |
- BMEN 454 | Analysis and Design Project II | 2 |
- ENGR 482/PHIL 482 | Ethics and Engineering | 3 |
- Technical elective 5 | | 6 |

**Biomedical Engineering - Minor**

The Department of Biomedical Engineering offers a minor in Biomedical Engineering.

**Program Requirements**

- BMEN 282/CHEN 282 | Engineering Biology | 3 |

Select 12 hours from one area: 1

**Bioinstrumentation Area**

- BMEN 207 | Computing for Biomedical Engineering | 1 |
- BMEN 321 | Biomedical Electronics | 3 |
- BMEN 420 | Medical Imaging | 3 |

1. A grade of C or better is required.
2. Entering students will be given a math placement exam. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.
3. Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.
4. Credit by examination for these courses also satisfies this requirement.
5. Technical electives are to be selected in consultation with student’s advisor from an approved list available from the departmental office.
Biomaterials Area
- BMEN 343 Introduction to Biomaterials
- BMEN 344 Biological Responses to Medical Devices
- Biomaterials technical electives

Biomechanics Area
- BMEN 341 Biofluid Mechanics
- BMEN 361 Biosolid Mechanics
- Biomechanics technical electives

Total Semester Credit Hours 15

1 Students must select courses exclusively from one of the three areas represented and not mixed.
2 See the departmental academic advisor for a complete list of technical electives.

Students must be admitted to a degree sequence in the Dwight Look College of Engineering or to the degree sequence in Biological and Agricultural Engineering.

**Engineering Therapeutics Manufacturing - Certificate**

The Engineering Therapeutics Manufacturing Certificate is intended to meet the requirements of industry by educating engineering BS graduates how to economically, ecologically and safely design and operate equipment used for the production and separation of biological materials. By the end of the certificate program, students will be able to:

1. understand the processing of biological materials
2. analyze functions and properties of biological materials
3. understand the impact of the use/misuse of biological materials
4. understand the life cycle and evolution of biological materials
5. design, operate and optimize biological process units

For additional information, contact the Engineering Therapeutics Manufacturing Certificate coordinator or Engineering Academic and Student Affairs, Room 129 Zachry Engineering Center, (979) 845-7200.

**Program Requirements**

**Required Course**
Select one of the following:

- BAEN 302 Biological and Agricultural Engineering Fundamentals II
- BAEN 601 Advanced Agricultural Systems Analysis
- CHEN 382 Bioprocess Engineering
- CHEN 651 Biochemical Engineering
- ISEN 360 Lean Thinking and Lean Engineering in the Process Industries
- ISEN 645 Lean Thinking and Lean Manufacturing
- VTPP 435 Physiology for Bioengineers II

**Prescribed Electives**
Select three of the following:

- BAEN 471/CHEN 471 Bioreactor Engineering
- BAEN 479 Biological and Agricultural Engineering Design I
- BAEN 489 Special Topics in... (Introduction to Separations)
- BAEN 631 Bioprocesses and Separations in Biotechnology
- BAEN 653 Bioreactor Design
- BMEN 430 Medical Device Regulation
- BMEN 440 Design of Medical Devices
- BMEN 486 Biomedical Nanotechnology
- BMEN 487 Drug Delivery
- BMEN 630 Global Medical Device Regulation
- BMEN 640 Design of Medical Devices
- BMEN 686 Biomedical Nanotechnology
- BMEN 687 Drug Delivery
- CHEN 440 Introduction to Transport Phenomena
- CHEN 463 Advanced Transport Phenomena I
- CHEN 464 Chemical Engineering Kinetics and Reactor Design
- CHEN 469 Process Dynamics and Advanced Process Control
- CHEN 471 Bioreactor Engineering
- CHEN 475 Process Safety Engineering
- CHEN 614 Advanced Transport Phenomena I
- CHEN 624 Chemical Engineering Kinetics and Reactor Design
- CHEN 629 Transport Phenomena
- CHEN 631 Process Dynamics and Advanced Process Control
- CHEN 655/SENG 655 Process Safety Engineering
- CHEN 663 Advanced Transport Phenomena I
- CHEN 665 Systems Biology
- ISEN 303 Engineering Economic Analysis
- ISEN 613 Engineering Data Analysis

Total Semester Credit Hours 12

**Quality Engineering for Regulated Medical Technologies - Certificate**

Quality engineering principles are mandated by federal and state regulations for clinical facilities and for the design, testing and manufacture of medical technologies (such as pharmaceuticals and imaging, diagnostic and therapeutic devices). Completion of this certificate requires specific instruction in quality engineering and regulation of medical technologies; moreover, candidates must go beyond understanding concepts and demonstrate appropriate usage of quality engineering principles in a medically related in medical care, candidates for this certificate are expected to be entering a high-growth job market for engineers.

For additional information, contact the Quality Engineering for Regulated Medical Technologies Certificate coordinator or Engineering Academic and Student Affairs, Room 129 Zachry Engineering Center, (979) 845-7200.

**Program Requirements**
Select one of the following:

BMEN 440  Design of Medical Devices  3
BMEN 640  Design of Medical Devices
BMEN 404  FDA Good Laboratory and Clinical Practices
BMEN 604  FDA Good Laboratory and Clinical Practices
BMEN 406  Medical Device Path to Market
BMEN 606  Medical Device Path to Market
BMEN 430  Medical Device Regulation
BMEN 630  Global Medical Device Regulation

Select one of the following:  3

ISEN 314  Statistical Control of Quality
ISEN 414  Total Quality Engineering
ISEN 614  Advanced Quality Control
XXEN 485 or 3
XXEN 684  Internship to be approved by certificate faculty to meet experience needs

Select one of the following:  3

BMEN 404  FDA Good Laboratory and Clinical Practices
BMEN 604  FDA Good Laboratory and Clinical Practices
BMEN 607  Clinical Engineering
BMEN 430  Medical Device Regulation
BMEN 630  Global Medical Device Regulation
BMEN 440  Design of Medical Devices
BMEN 640  Design of Medical Devices
ISEN 314  Statistical Control of Quality
ISEN 414  Total Quality Engineering
ISEN 614  Advanced Quality Control
ISEN 616  Design and Analysis of Industrial Experiments
MMET 418  Medical Manufacturing
VTMI 629/ 3
SCSC 629  Laboratory Quality Systems

Total Semester Credit Hours  12

1 Course cannot be used to satisfy the required courses, and both the undergraduate and graduate versions of the same course cannot be used. For example, BMEN 404 and BMEN 604 cannot both count toward fulfilling requirements.

Artie McFerrin Department of Chemical Engineering

Chemical engineering is a broad field of engineering and thus requires a diverse preparation in science and engineering. Distinguishing chemical engineering from other engineering disciplines is its use of chemical and biochemical reactions to produce products and materials for society. Traditionally, chemical engineers have provided leadership in the petrochemical, refining, chemical, polymer, and food processing industries. Because of strengths in the foundation sciences of mathematics, chemistry, physics and biology, as well as in engineering, this leadership role has now extended to the biochemical, biomedical, high-tech materials, semi-conductor and microelectronics, nanotechnology, environmental quality, safety, and a host of other areas. Chemical engineers have consistently commanded starting salaries among the highest of all college graduates because of the combined breadth and depth of their education.

The mission of the Artie McFerrin Department of Chemical Engineering at Texas A&M is to educate and prepare students for national and international leadership roles in industry, government, and academia; to attract top students to chemical engineering; to define and develop new directions in chemical engineering fundamentals and practices, and in chemical engineering education and curricula; to be a valuable resource and service base to the State and to industry; and to provide leadership in solving problems of social and economic importance.

Objectives of the chemical engineering program are that

1. graduates will have successful chemical engineering careers in industry, academia or government,
2. graduates will obtain, apply and transfer knowledge across disciplines and into emerging areas of chemical engineering and related fields,
3. graduates will communicate effectively, be leaders in their fields and work competently in interdisciplinary teams, and
4. graduates will be professionally responsible and ethical and engage in professional activities to impact the society on a global scale.

To supplement coursework, well-equipped laboratories provide our students with experiences in operating and analyzing a variety of unit operations and process control equipment and in the use of the modern computational tools and software used in chemical engineering. The department offers vibrant undergraduate research, co-op and study abroad programs that provide students with additional enrichment and experiential opportunities.

The undergraduate program in Chemical Engineering at Texas A&M University is accredited by the Engineering Accreditation Commission of ABET, www.abet.org, and compares favorably with the best in the nation.

Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

Faculty

Akbulut, Mustafa, Associate Professor
Chemical Engineering
PhD, University of California, Santa Barbara, 2007

Balbuena, Perla B, Professor
Chemical Engineering
PhD, University of Texas, 1996

Baldwin, John T, Senior Lecturer
Chemical Engineering
PhD, Texas A&M University, 1968

Bukur, Dragomir B, Professor
Chemical Engineering
PhD, University of Minnesota, 1974

Cheng, Zheng Dong, Associate Professor
Chemical Engineering
PhD, Princeton University, 1999

Dewan, Mohammad A, Lecturer
Chemical Engineering
PhD, Washington State University, 2010

El-Halwagi, Mahmoud M, Associate Professor
Chemical Engineering
PhD, University of California, Los Angeles, 1990
Elabd, Yossef A, Professor
Chemical Engineering
PhD, John Hopkins University, 2001

Floudas, Christodoulos, Professor
Chemical Engineering
PhD, Carnegie Mellon University, 1986

Glover, Charles J, Professor
Chemical Engineering
PhD, Rice University, 1975

Green, Micah, Associate Professor
Chemical Engineering
PhD, Massachusetts Institute of Technology, 2007

Hall, Kenneth R, Professor
Chemical Engineering
PhD, University of Oklahoma, 1967

Hasan, M M Faruque, Assistant Professor
Chemical Engineering
PhD, National University of Singapore, 2010

Holste, James C, Professor
Chemical Engineering
PhD, Iowa State University, 1973

Holtzapple, Mark T, Professor
Chemical Engineering
PhD, University of Pennsylvania, 1981

Isdale, Charles E, Senior Lecturer
Chemical Engineering
MBA, Southern Illinois University, 1977

Jayaraman, Arul, Professor
Chemical Engineering
PhD, University of California, Irvine, 1998

Jeong, Hae-Kwon, Associate Professor
Chemical Engineering
PhD, University of Minnesota, 2004

Kao, Katy C, Associate Professor
Chemical Engineering
PhD, University of California, Los Angeles, 2005

Karim, Muhammad N, Professor
Chemical Engineering
PhD, University of Manchester, 1977

Kravaris, Costas, Professor
Chemical Engineering
PhD, California Institute of Technology, 1984

Kuo, Yue, Professor
Chemical Engineering
PhD, Columbia University, 1980

Lutkenhaus, Jodie L, Associate Professor
Chemical Engineering
PhD, University of Notre Dame, 2003

Mannan, Mahboobul, Professor
Chemical Engineering
PhD, University of Oklahoma, 1986

Mashuga, Chad V, Assistant Professor
Chemical Engineering
PhD, Michigan Technological University, 1999

Mentzer, Ray A, Senior Lecturer
Chemical Engineering
PhD, Purdue University, 1980

Pistikopoulos, Efstratios, Professor
Chemical Engineering
PhD, Carnegie Mellon University, 1988

Rogers, William J, Lecturer
Chemical Engineering
PhD, Ohio State University, 1976

Seminario, Jorge M, Professor
Chemical Engineering
PhD, Southern Illinois University, 1987

MS, Southern Illinois University, 1984

Tamamis, Phanourios, Assistant Professor
Chemical Engineering
PhD, University of Cyprus, 2010

Ugaz, Victor M, Professor
Chemical Engineering
PhD, Northwestern University, 1999

Vaddiraju, Sreeram, Associate Professor
Chemical Engineering
PhD, University of Louisville, 2006

White, James D, Senior Lecturer
Chemical Engineering
BA, Texas A&M University, 1978

Wilhite, Benjamin A, Associate Professor
Chemical Engineering
PhD, University of Notre Dame, 2003

Wilson, Christin, Lecturer
Chemical Engineering
PhD, Ohio State University, 2012

Wu, Hung-Jen, Assistant Professor
Chemical Engineering
PhD, Texas A&M University, 2006

Majors
• Bachelor of Science in Chemical Engineering (p. 303)

Minors
• Chemical Engineering Minor (p. 305)

Chemical Engineering - BS

The chemical engineering curriculum provides a balanced education in virtually all aspects of chemical engineering principles and practice and includes education in economics, language, philosophy and culture and communication. Chemical engineering courses emphasize fundamentals
and methods that are applicable to the analysis, development, design and operation of a wide variety of chemical engineering systems and processes, thereby providing the necessary background for entry into the wide array of activities described above. At the same time, specific example applications provide the student with insight into the ability of chemical engineers to work in such a variety of areas. The curriculum is structured to offer students an opportunity to extend and apply the fundamentals developed in the basic courses toward more focused areas of specialization. The sequence of courses converges in the senior year into a comprehensive capstone design course that includes elements of economics, safety and environmental issues. The course provides an experience much like that of an industry design project. It is this philosophy of fundamentals, applications and design that has enabled our chemical engineering graduates to adapt readily to a dynamic and rapidly changing world and to solve problems they have not previously experienced.

Program Requirements

First Year

**Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 101 &amp; CHEM 111</td>
<td>Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory I</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 111</td>
<td>Foundations of Engineering I</td>
<td>2</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 218</td>
<td>Mechanics</td>
<td>4</td>
</tr>
<tr>
<td><strong>University Core Curriculum (p. 19)</strong></td>
<td>3</td>
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**Spring**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 102 &amp; CHEM 112</td>
<td>Fundamentals of Chemistry II and Fundamentals of Chemistry Laboratory II</td>
<td>4</td>
</tr>
<tr>
<td>ENGR 112</td>
<td>Foundations of Engineering II</td>
<td>2</td>
</tr>
<tr>
<td>MATH 152</td>
<td>Engineering Mathematics II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 208</td>
<td>Electricity and Optics</td>
<td>4</td>
</tr>
<tr>
<td><strong>University Core Curriculum (p. 19)</strong></td>
<td>3</td>
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**Second Year**

**Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 227 &amp; CHEM 237</td>
<td>Organic Chemistry I and Organic Chemistry Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>CHEN 204</td>
<td>Elementary Chemical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>MATH 251</td>
<td>Engineering Mathematics III</td>
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</tr>
<tr>
<td><strong>University Core Curriculum (p. 19)</strong></td>
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**Spring**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 228 &amp; CHEM 238</td>
<td>Organic Chemistry II and Organic Chemistry Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>CHEN 205</td>
<td>Chemical Engineering Thermodynamics I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
<td>3</td>
</tr>
<tr>
<td>MATH 308</td>
<td>Differential Equations</td>
<td>3</td>
</tr>
</tbody>
</table>

Second Year

| University Core Curriculum (p. 19) | 3                           |

**Third Year**

**Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term Semester Credit Hours</th>
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<tbody>
<tr>
<td>CHEM 316</td>
<td>Quantitative Analysis</td>
<td>2</td>
</tr>
<tr>
<td>CHEN 304</td>
<td>Chemical Engineering Fluid Operations</td>
<td>3</td>
</tr>
<tr>
<td>CHEN 313</td>
<td>Chemical Engineering Materials</td>
<td>3</td>
</tr>
<tr>
<td>CHEN 320</td>
<td>Numerical Analysis for Chemical Engineers</td>
<td>3</td>
</tr>
<tr>
<td>CHEN 354</td>
<td>Chemical Engineering Thermodynamics II</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 482/PHIL 482</td>
<td>Ethics and Engineering</td>
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**Spring**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 322</td>
<td>Physical Chemistry for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>CHEN 323</td>
<td>Chemical Engineering Heat Transfer Operations</td>
<td>3</td>
</tr>
<tr>
<td>CHEN 382</td>
<td>Bioprocess Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ECEN 215 or MEEN 221</td>
<td>Principles of Electrical Engineering or Statics and Particle Dynamics</td>
<td>3</td>
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<tr>
<td><strong>University Core Curriculum (p. 19)</strong></td>
<td>3</td>
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**Fourth Year**

**Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CHEN 414</td>
<td>Chemical Engineering Laboratory I</td>
<td>1</td>
</tr>
<tr>
<td>CHEN 424</td>
<td>Chemical Engineering Mass Transfer Operations</td>
<td>3</td>
</tr>
<tr>
<td>CHEN 425</td>
<td>Process Integration, Simulation and Economics</td>
<td>3</td>
</tr>
<tr>
<td>CHEN 455/SENG 455</td>
<td>Process Safety Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CHEN 461</td>
<td>Process Dynamics and Control</td>
<td>3</td>
</tr>
<tr>
<td>CHEN 481</td>
<td>Seminar</td>
<td>1</td>
</tr>
<tr>
<td><strong>University Core Curriculum (p. 19)</strong></td>
<td>3</td>
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</tr>
</tbody>
</table>

**Spring**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEN 426</td>
<td>Chemical Engineering Plant Design</td>
<td>3</td>
</tr>
<tr>
<td>CHEN 433</td>
<td>Chemical Engineering Laboratory II</td>
<td>1</td>
</tr>
<tr>
<td>CHEN 464</td>
<td>Kinetics and Reactor Design</td>
<td>3</td>
</tr>
<tr>
<td>CHEN specialty options</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>University Core Curriculum (p. 19)</strong></td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours:** 128

1. A grade of C or better is required.
2. CHEM 107/117 may be used to fulfill this requirement.
3. Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.
The mission of the Zachry Department of Civil Engineering is to produce graduates:

1. who are prepared to enter civil engineering practice and/or continue their education through study in graduate and professional programs, and
2. most of whom will become practicing civil engineers with most of these becoming licensed professional engineers, and
3. many of whom will pursue advanced studies.

The undergraduate program in civil engineering within the Zachary Department of Civil Engineering at Texas A&M University is accredited by the Engineering Accreditation Commission of ABET, www.abet.org. The undergraduate program in civil engineering within the Zachary Department of Civil Engineering at Texas A&M University promotes the highest academic standards of excellence, quality, and ethics in both our undergraduate and graduate programs, and in doing so create both a culture of excellence and a community of scholars. Through our programs, our faculty and graduates provide local, state, national, and international leadership to a profession that must solve the civil and/or ocean engineering problems facing an increasingly complex society.

The undergraduate program in civil engineering within the Zachary Department of Civil Engineering at Texas A&M is accredited by the Engineering Accreditation Commission of ABET, www.abet.org. Graduate programs in civil engineering are also available. These programs allow further specialization and offer more in-depth study to address more complex technical and management issues. Graduate degrees also offer additional employment opportunities.

Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

**Ocean Engineering**

Ocean engineering is the application of basic engineering principles to the analysis, design, construction, and management of systems that operate in the ocean environment or near shore. Typical ocean engineering application areas include: beach protection and nourishment, coastal structures, coastal erosion, development of ocean energy resources, instrumentation for coastal and offshore measurements, marine dredging and dredged material placement, moored and towed systems, ocean mining, offshore petroleum recovery, offshore structures, ports and harbors, search and salvage, suspended and dissolved constituent transport, subsea pipelines and cables, submersible vehicles, and underwater acoustics. Employment opportunities exist with private industry, defense contractors, consulting firms, and government agencies. Ocean engineering students are encouraged to pursue summer
Internships and may participate in the University cooperative education program. The curriculum leading to a Bachelor of Science degree in ocean engineering is administered by the Coastal and Ocean Engineering Division of the Zachry Department of Civil Engineering. The undergraduate program in ocean engineering within the Zachry Department of Civil Engineering at Texas A&M is accredited by the Engineering Accreditation Commission of ABET, www.abet.org.

The mission of the Ocean Engineering Program is to conduct research, serve the public, and educate students in a broad program of instruction encompassing traditional and emerging areas of ocean engineering. Graduates are prepared for entering engineering practice, continuing onto graduate study, life-long learning and professional development. Students develop a sense of professionalism and an appreciation for the obligations of a professional engineer. The Program offers ocean engineering continuing education activities for the people and marine industry of the state, nation and international community. The Program serves the public and engineering profession in Texas and the nation through participation of faculty and students in public and professional activities. Applied and fundamental research is conducted that contributes to the better understanding of ocean engineering and supports student educational development.

The objectives of the Ocean Engineering Program are to graduate students that are qualified to contribute to the ocean engineering profession and society, gain employment in ocean engineering and related engineering fields with private and government organizations, and advance to positions of increased responsibility. Some graduates become professional engineers and members of ocean engineering related professional societies, pursue company training and continuing education activities, and attend technical conferences. Some graduates pursue graduate studies in ocean engineering and related fields and receive post baccalaureate degrees.

The laboratory facilities for the Ocean Engineering Program are among the most comprehensive in the nation for testing offshore and coastal systems. The facilities are located in the Reta and Bill Haynes '46 Coastal Engineering Laboratory, Offshore Technology Research Center and the Civil Engineering Laboratory Building. These facilities include a large deep water wave basin, a towing tank, a wave channel, a shallow water wave basin and data acquisition systems. Additional information is available on the Zachry Department of Civil Engineering website.

Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

**Faculty**

Anderson, Stuart, Professor  
Civil Engineering  
PhD, University of Texas, 1989

Aubeny, Charles P, Professor  
Civil Engineering  
PhD, Massachusetts Institute of Technology, 1992

Autenrieth, Robin L, Professor  
Civil Engineering  
PhD, Clarkson University, 1986

Banks, Margaret K, Professor  
Civil Engineering  
PhD, Duke University, 1989

Barroso, Luciana R, Associate Professor  
Civil Engineering  
PhD, Stanford University, 1999

Batchelor, Bill, Professor  
Civil Engineering  
PhD, Cornell University, 1976

Beason, William L, Associate Professor  
Civil Engineering  
PhD, Texas Tech University, 1980

Birely, Anna C, Assistant Professor  
Civil Engineering  
PhD, University of Washington, 2012

Bracci, Joseph M, Professor  
Civil Engineering  
PhD, University at Buffalo, State University of New York, 1992

Briaud, Jean-Louis, Professor  
Civil Engineering  
PhD, University of Ottawa, Canada, 1979

Brumbelow, James K, Associate Professor  
Civil Engineering  
PhD, Georgia Institute of Technology, 2001

Burris, Mark W, Professor  
Civil Engineering  
PhD, University of South Florida, 2001

Cahill, Anthony T, Associate Professor  
Civil Engineering  
PhD, John Hopkins University, 1998

Chang, Kuang-An, Professor  
Civil Engineering  
PhD, Cornell University, 1999

Chen, Hahn C, Professor  
Civil Engineering  
PhD, University of Iowa, 1982

Chinn, Timothy D, Professor Of The Practice  
Civil Engineering  
BS, Texas A&M University, 1980

Chu, Kung-Hui, Associate Professor  
Civil Engineering  
PhD, University of California, Berkeley, 1998

Damnjanovic, Ivan, Associate Professor  
Civil Engineering  
PhD, University of Texas, 2006

England, Peter S, Instructional Associate Professor  
Civil Engineering  
PhD, Texas Tech University, 2011

Falzarano, Jeffrey M, Professor  
Civil Engineering  
PhD, University of Michigan, 1990
Dwight Look College of Engineering

Ford, David N, Associate Professor
Civil Engineering
PhD, Massachusetts Institute of Technology, 1995

Fry, Gary T, Associate Professor
Civil Engineering
PhD, University of Illinois, 1995

Gao, Huilin, Assistant Professor
Civil Engineering
PhD, Princeton University, 2005

Gharaibeh, Nasir G, Associate Professor
Civil Engineering
PhD, University of Illinois, 1997

Grasley, Zachary C, Associate Professor
Civil Engineering
PhD, University of Illinois, 2006

Hawkins, Harvey E, Associate Professor
Civil Engineering
PhD, Texas A&M University, 1993

Hueste, Marybeth D, Professor
Civil Engineering
PhD, University of Michigan, 1997

Hurlebaus, Stefan, Associate Professor
Civil Engineering
DEng, University of Stuttgart, Germany, 2002

James, Ray W, Associate Professor
Civil Engineering
PhD, University of Texas, Austin, 1976

Jones, Harry L, Associate Professor
Civil Engineering
PhD, University of Illinois, 1969

Kaihatu, James M, Associate Professor
Civil Engineering
PhD, University of Delaware, 1994

Kanta, Luthansa R, Assistant Lecturer
Civil Engineering
PhD, Texas A&M University, 2009

Keating, Peter B, Associate Professor
Civil Engineering
PhD, Lehigh University, 1987

Kim, Moohyun, Professor
Civil Engineering
PhD, Massachusetts Institute of Technology, 1988

Little, Dallas N, Professor
Civil Engineering
PhD, Texas A&M University, 1979

Lord, Dominique, Associate Professor
Civil Engineering
PhD, University of Toronto, 2000

Lowery, Lee L, Professor
Civil Engineering
PhD, Texas A&M University, 1967

Lytton, Robert L, Professor
Civil Engineering
PhD, University of Texas, Austin, 1967

Ma, Xingmao, Associate Professor
Civil Engineering
PhD, Missouri University of Science and Technology, 2004

Mander, John B, Professor
Civil Engineering
PhD, University of Canterbury, New Zealand, 1984

Martin, Amy E, Professor
Civil Engineering
PhD, University of California, Berkeley, 1997

Medina Cetina, Zenon, Associate Professor
Civil Engineering
PhD, John Hopkins University, 2007

Mercier, Richard S, Professor
Civil Engineering
PhD, Massachusetts Institute of Technology, 1985

Miller, Gretchen R, Assistant Professor
Civil Engineering
PhD, University of California, Berkeley, 2009

Niedzwecki, John M, Professor
Civil Engineering
PhD, The Catholic University of America, 1977

Noshadran, Arash, Research Assistant Professor
Civil Engineering
PhD, University of Southern California, 2011

Olivera, Francisco, Associate Professor
Civil Engineering
PhD, University of Texas, 1996

Otey, Jeffrey M, Instructional Assistant Professor
Civil Engineering
MEN, Texas A&M University, 1994

Park, Philip, Assistant Professor
Civil Engineering
PhD, University of Michigan, 2012

Quadrifoglio, Luca, Associate Professor
Civil Engineering
PhD, University of Southern California, 2005

Randall, Robert E, Professor
Civil Engineering
PhD, University of Rhode Island, 1972

Sakhaei Far, Maryam S, Assistant Professor
Civil Engineering
PhD, North Carolina State University, 2011
Sanchez Castilla, Marcelo Javier, Associate Professor
Civil Engineering
PhD, Universidad Politecnica de Catalunya (UPC), Barcelona, Spain, 2004

Scarfuto, Jessica C, Assistant Lecturer
Civil Engineering
MS, Texas A&M University, 2014

Shidlovskaya, Anna V, Visiting Professor
Civil Engineering
PhD, National Mineral Resources University, Russia, 2005

Socolofsky, Scott A, Associate Professor
Civil Engineering
PhD, Massachusetts Institute of Technology, 2001

Walewski, John A, Associate Professor Of The Practice
Civil Engineering
PhD, University of Texas, 2005

Wang, Binbin, Lecturer
Civil Engineering
PhD, University of Wisconsin-Milwaukee, 2013

Wang, Xiubin B, Associate Professor
Civil Engineering
PhD, University of California, Davis, 2004

Zhong, Yunlong, Associate Professor
Civil Engineering
PhD, Virginia Tech, 1996

Zollinger, Dan, Professor
Civil Engineering
PhD, University of Illinois at Urbana-Champaign, 1989

Majors

- Bachelor of Science in Civil Engineering (p. 308)
- Bachelor of Science in Civil Engineering, Coastal and Ocean Engineering Track (p. 310)
- Bachelor of Science in Civil Engineering, Construction Engineering and Management Track (p. 311)
- Bachelor of Science in Civil Engineering, Environmental Engineering Track (p. 313)
- Bachelor of Science in Civil Engineering, General Civil Engineering Track (p. 315)
- Bachelor of Science in Civil Engineering, Geotechnical Engineering Track (p. 317)
- Bachelor of Science in Civil Engineering, Structural Engineering Track (p. 319)
- Bachelor of Science in Civil Engineering, Transportation Engineering Track (p. 321)
- Bachelor of Science in Civil Engineering, Water Resources Engineering Track (p. 323)

Civil Engineering - BS

The first two years of the civil engineering curriculum build a solid foundation in mathematics, science and engineering science which are the necessary building blocks for a successful career in engineering. The third year provides an introduction to the various civil engineering disciplines and engineering principles, methods of analysis, and design. The fourth year provides the opportunity to pursue either a broad based program in general civil engineering or pursue more depth in an area of specialization by choice of one of eight tracks, described further below. The curriculum also includes courses in history, government/political science, social sciences, language, philosophy and culture and creative arts that help students:

1. understand the need for considering the global and societal context in which engineering solutions are completed,
2. understand professional and ethical responsibility, and
3. be knowledgeable of contemporary issues.

Students are encouraged to participate in cooperative education or to intern with civil engineering agencies during their undergraduate education.

All students must choose one of the eight tracks in the BS in Civil Engineering curriculum: construction engineering and management (p. 311), coastal and ocean (p. 310), environmental (p. 313), general (p. 315), geotechnical (p. 317), structural (p. 319), transportation (p. 321), and water resources (p. 323). The choice of track determines acceptable courses for technical electives listed in the general curriculum.

Program Requirements

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 111</td>
<td>2</td>
</tr>
<tr>
<td>MATH 151</td>
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</tr>
<tr>
<td>PHYS 218</td>
<td>4</td>
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1. Senior Year
<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Spring</td>
<td>16</td>
</tr>
<tr>
<td>CHEM 107</td>
<td>General Chemistry for Engineering Students</td>
</tr>
<tr>
<td>CHEM 117</td>
<td>General Chemistry for Engineering Students Laboratory</td>
</tr>
<tr>
<td>ENGR 112</td>
<td>Foundations of Engineering II</td>
</tr>
<tr>
<td>MATH 152</td>
<td>Engineering Mathematics II</td>
</tr>
<tr>
<td>PHYS 208</td>
<td>Electricity and Optics</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Semester Credit Hours</strong></td>
<td><strong>33</strong></td>
</tr>
</tbody>
</table>

1. A grade of C or better is required.
2. Entering students will be given a math placement exam. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.
3. Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.
4. BMEN, CHEN and RHEN require 8 hours of freshman chemistry, which may be satisfied by CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112; Credit by Examination (CBE) for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 plus CHEM 102/CHEM 112; or 8 hours of CBE for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112.

<table>
<thead>
<tr>
<th>Second Year</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Fall</td>
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</tr>
<tr>
<td>CVEN 207</td>
<td>Introduction to the Civil Engineering Profession</td>
</tr>
<tr>
<td>CVEN 221</td>
<td>Engineering Mechanics: Statics</td>
</tr>
<tr>
<td>MATH 251</td>
<td>Engineering Mathematics III</td>
</tr>
<tr>
<td>STAT 211</td>
<td>Principles of Statistics I</td>
</tr>
<tr>
<td>COMM 205 or ENGL 210</td>
<td>Communication for Technical Professions or Technical and Business Writing</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Term Semester Credit Hours</strong></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CVEN 250</td>
<td>Introduction to Graphics and Visualization Applications in Civil Engineering Design</td>
</tr>
<tr>
<td>CVEN 302</td>
<td>Computer Applications in Engineering and Construction</td>
</tr>
<tr>
<td>CVEN 303</td>
<td>Civil Engineering Measurement</td>
</tr>
<tr>
<td>CVEN 305</td>
<td>Mechanics of Materials</td>
</tr>
<tr>
<td>CVEN 306</td>
<td>Materials Engineering for Civil Engineers</td>
</tr>
<tr>
<td>MATH 308</td>
<td>Differential Equations</td>
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<tr>
<td><strong>Term Semester Credit Hours</strong></td>
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<table>
<thead>
<tr>
<th>Third Year</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>Fall</td>
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</tr>
<tr>
<td>CVEN 311</td>
<td>Fluid Dynamics</td>
</tr>
<tr>
<td>CVEN 322</td>
<td>Civil Engineering Systems</td>
</tr>
<tr>
<td>CVEN 345</td>
<td>Theory of Structures</td>
</tr>
<tr>
<td>CVEN 363</td>
<td>Engineering Mechanics: Dynamics</td>
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<tr>
<td>Technical elective</td>
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<tr>
<td><strong>Term Semester Credit Hours</strong></td>
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<table>
<thead>
<tr>
<th>Spring</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select one of the following:</td>
<td></td>
</tr>
<tr>
<td>BAEN 320</td>
<td>Engineering Thermodynamics</td>
</tr>
<tr>
<td>ECEN 215</td>
<td>Principles of Electrical Engineering</td>
</tr>
<tr>
<td>MEEN 315</td>
<td>Principles of Thermodynamics</td>
</tr>
<tr>
<td>Technical elective</td>
<td>5</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Term Semester Credit Hours</strong></td>
<td><strong>15</strong></td>
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<table>
<thead>
<tr>
<th>Fourth Year</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Fall</td>
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</tr>
<tr>
<td>CVEN 424</td>
<td>Civil Engineering Professional Practice</td>
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<tr>
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<td>5</td>
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<tr>
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<tr>
<td><strong>Term Semester Credit Hours</strong></td>
<td><strong>17</strong></td>
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<table>
<thead>
<tr>
<th>Spring</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>ENGR 482/PHIL 482</td>
<td>Ethics and Engineering</td>
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<td>Technical elective</td>
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<td>University Core Curriculum (p. 19)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Term Semester Credit Hours</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

| Total Semester Credit Hours: | 95 |

5. A total of 33 hours of technical electives is required. Technical electives are divided into four categories: science courses, breadth courses, focus courses, and capstone design courses. The choice of courses to be taken in each of the four categories depends on the track chosen and must be made in consultation with the student’s advisor and/or the Civil Engineering Undergraduate Student Services Office. Capstone design courses must include more than one civil engineering context.
6. All students must take at least two courses in their major that are designated as writing intensive (W). ENGR 482/PHIL 482 and CVEN 424 taken at Texas A&M satisfy this requirement. Other CVEN courses may be approved as W courses at a later date. A grade of C or better is required in these courses.

A grade of C or better is required in all science, mathematics and engineering courses taken to satisfy degree requirements.

**Total Program Hours 128**
Civil Engineering, BS - Coastal and Ocean Engineering Track

The Coastal and Ocean Engineering Track to fulfill the BS in Civil Engineering degree emphasizes breadth across civil engineering with a focus on coastal and offshore engineering. The focus electives prepare students to analyze and design systems for shallow and deep water environments. The track is appropriate for a career related to coastal and offshore engineering, and for those planning on further specialization in graduate studies.

Program Requirements

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

First Year

### Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 111</td>
<td>Foundations of Engineering I</td>
<td>2</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 218</td>
<td>Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td></td>
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</tr>
</tbody>
</table>

**Term Semester Credit Hours:** 16

### Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN 207</td>
<td>Introduction to the Civil Engineering Profession</td>
<td>1</td>
</tr>
<tr>
<td>CVEN 221</td>
<td>Engineering Mechanics: Statics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 251</td>
<td>Engineering Mathematics III</td>
<td>3</td>
</tr>
<tr>
<td>STAT 211</td>
<td>Principles of Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>COMM 205 or ENGL 210</td>
<td>Communication for Technical Professions or Technical and Business Writing</td>
<td>3</td>
</tr>
</tbody>
</table>

**Term Semester Credit Hours:** 17

**Total Semester Credit Hours:** 33

Second Year

### Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</tr>
</thead>
<tbody>
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<td>CVEN 302</td>
<td>Computer Applications in Civil Engineering Design</td>
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</tr>
<tr>
<td>CVEN 303</td>
<td>Civil Engineering Measurement</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 305</td>
<td>Mechanics of Materials</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 306</td>
<td>Materials Engineering for Civil Engineers</td>
<td>3</td>
</tr>
<tr>
<td>MATH 308</td>
<td>Differential Equations</td>
<td>3</td>
</tr>
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<td>University Core Curriculum (p. 19)</td>
<td></td>
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</table>

**Term Semester Credit Hours:** 16

### Spring Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 107</td>
<td>General Chemistry for Engineering Students</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 117</td>
<td>General Chemistry for Engineering Students</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 112</td>
<td>Foundations of Engineering II</td>
<td>2</td>
</tr>
<tr>
<td>MATH 152</td>
<td>Engineering Mathematics II</td>
<td>4</td>
</tr>
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<td>PHYS 208</td>
<td>Electricity and Optics</td>
<td>4</td>
</tr>
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<td>University Core Curriculum (p. 19)</td>
<td></td>
<td>3</td>
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</table>

**Term Semester Credit Hours:** 17

**Total Semester Credit Hours:** 33

Third Year

### Fall Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN 311</td>
<td>Fluid Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 322</td>
<td>Civil Engineering Systems</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 345</td>
<td>Theory of Structures</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 363</td>
<td>Engineering Mechanics: Dynamics</td>
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</tr>
<tr>
<td>Technical elective</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

**Term Semester Credit Hours:** 15

### Spring Semester

Select one of the following:
- BAEN 320 Engineering Thermodynamics
- ECEN 215 Principles of Electrical Engineering
- MEEN 315 Principles of Thermodynamics
- Technical elective 5

**Term Semester Credit Hours:** 9

1. A grade of C or better is required.
2. Entering students will be given a math placement exam. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.
3. Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.
4. BMEN, CHEN and RHEN require 8 hours of freshman chemistry, which may be satisfied by CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112; Credit by Examination (CBE) for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 plus CHEM 102/CHEM 112; or 8 hours of CBE for CHEM 101/CHEM 111 or CHEM 107/CHEM 112 and CHEM 102/CHEM 112.
Total Program Hours 128

Coastal and Ocean Engineering Track - Technical Electives

Technical electives for the BS in Civil Engineering, Coastal and Ocean Engineering Track are composed of a SCIENCE course (3 semester credit hours), BREADTH courses (13 semester credit hours), FOCUS courses (13 semester credit hours), and a CAPSTONE DESIGN course (4 semester credit hours), as delineated below, for a total of 33 semester credit hours. A substitution for any course in the track must be approved in writing by the Civil Engineering Undergraduate Student Services Office, CE Building, Room 140.

SCIENCE Course (3 Semester Credit Hours Required)

OCNG 401  Interdisciplinary Oceanography 
OCNG 410 or Introduction to Physical Oceanography 

BREADTH Courses (13 Semester Credit Hours)

CVEN 365  Introduction to Geotechnical Engineering 
CVEN 444  Structural Concrete Design 
or CVEN 446 or Structural Steel Design 

Choose 4 Semester Credit Hours From:

OCEN 336 Fluid Dynamics Laboratory 
OCEN 362 Hydromechanics 
OCEN 410 Ocean Engineering Laboratory 
CVEN 339 Water Resources Engineering 

FOCUS Courses (13 Semester Credit Hours Required)

OCEN 300 Ocean Engineering Wave Mechanics 
OCEN 481 Seminar 

Choose 9 Semester Credit Hours From: 

OCEN 400 Basic Coastal Engineering 
OCEN 401 Underwater Acoustics for Ocean Engineers 
OCEN 402 Principles of Naval Architecture 
OCEN 403 Dynamics of Offshore Structures 
OCEN 407 Design of Ocean Engineering Facilities 
OCEN 408 Underwater and Moored System Design 
OCEN 410 Ocean Engineering Laboratory 
OCEN 475 Environmental Fluid Mechanics 
CVEN 402 Engineered Environmental Systems 
CVEN 403 Applied Civil Engineering Surveying 
CVEN 405 Construction Management of Field Operations 
CVEN 406 Environmental Protection and Public Health 
CVEN 423 Geomatics for Civil Engineering 
CVEN 435 Geotechnical Engineering Design 
CVEN 445 Matrix Methods of Structural Analysis 
CVEN 458 Hydraulic Engineering of Water Distribution Systems 
CVEN 473 Engineering Project Estimating and Planning 

CAPSTONE DESIGN Course (4 Semester Credit Hours Required)

OCEN 407 Design of Ocean Engineering Facilities 

1  Among these 9 semester credit hours, students must take at least one of the following: OCEN 400, OCEN 402, OCEN 403.

2  CVEN 403 is a 2 semester credit hour course. Students must typically earn an additional 1 semester credit hour of Focus course credit and should consult with their advisors for guidance on appropriate courses with which to earn this credit.

Civil Engineering - BS, Construction Engineering and Management Track

The Construction Engineering and Management Track to fulfill the BS in Civil Engineering degree emphasizes specialized coursework in the fundamentals of construction engineering and project management. The
Track blends the principles of basic science, engineering, and technology with a strong component of business coursework. The Track is appropriate for students interested in a career in the construction industry.

**Program Requirements**

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

### First Year

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<tr>
<th>Course Code</th>
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</tr>
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<td>University Core Curriculum</td>
<td>(p. 19)</td>
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</table>

**Term Semester Credit Hours:** 16

#### Spring

<table>
<thead>
<tr>
<th>Course Code</th>
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</tr>
</thead>
<tbody>
<tr>
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</table>

**Term Semester Credit Hours:** 16

### Second Year

#### Fall

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>CVEN 207</td>
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<tr>
<td>or Technical and Business Writing</td>
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**Term Semester Credit Hours:** 16

#### Spring

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
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<td>Introduction to Graphics and Visualization</td>
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</tr>
<tr>
<td>CVEN 302</td>
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<td>CVEN 303</td>
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<td>Mechanics of Materials</td>
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</tr>
<tr>
<td>CVEN 306</td>
<td>Materials Engineering for Civil Engineers</td>
<td>3</td>
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<td>MATH 308</td>
<td>Differential Equations</td>
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**Term Semester Credit Hours:** 17

### Third Year

#### Fall

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<thead>
<tr>
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<td>Theory of Structures</td>
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<td>CVEN 363</td>
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**Term Semester Credit Hours:** 15

#### Spring

<table>
<thead>
<tr>
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<th>Course Title</th>
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<tbody>
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<td>BAEN 320</td>
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<tr>
<td>ECEN 215</td>
<td>Principles of Electrical Engineering</td>
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<tr>
<td>MEEN 315</td>
<td>Principles of Thermodynamics</td>
<td>3</td>
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<tr>
<td>Technical elective</td>
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<td>3</td>
</tr>
<tr>
<td>University Core Curriculum</td>
<td>(p. 19)</td>
<td>3</td>
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</table>

**Term Semester Credit Hours:** 15

### Fourth Year

Select one of the following:

- BAEN 320 | Engineering Thermodynamics
- ECEN 215 | Principles of Electrical Engineering
- MEEN 315 | Principles of Thermodynamics

**Technical elective** | 9

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>University Core Curriculum</td>
<td>(p. 19)</td>
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</table>

**Term Semester Credit Hours:** 15

**Total Semester Credit Hours:** 33

---

1. A grade of C or better is required.
2. Entering students will be given a math placement exam. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.
3. Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.

4. BMEN, CHEN and RHEN require 8 hours of freshman chemistry, which may be satisfied by CHEM 101/107/111 or CHEM 102/112 or CHEM 107/111 plus CHEM 102/111 2; or 8 hours of CBE for CHEM 101/107/111 or CHEM 102/111 2; or 8 hours of CBE for CHEM 102/111 2.
5 A total of 33 hours of technical electives is required. Technical electives are divided into four categories: science courses, breadth courses, focus courses, and capstone design courses. The choice of courses to be taken in each of the four categories depends on the track chosen and must be made in consultation with the student’s advisor and/or the Civil Engineering Undergraduate Student Services Office. Capstone design courses must include more than one civil engineering context.

6 All students must take at least two courses in their major that are designated as writing intensive (W). ENGR 482/PHIL 482 and CVEN 424 taken at Texas A&M satisfy this requirement. Other CVEN courses may be approved as W courses at a later date. A grade of C or better is required in these courses.

A grade of C or better is required in all science, mathematics and engineering courses taken to satisfy degree requirements.

**Total Program Hours 128**

**Construction Engineering and Management Track - Technical Electives**

Technical electives for the BS in Civil Engineering, Construction Engineering and Management Track are composed of a SCIENCE course (3 semester credit hours), BREADTH courses (18 semester credit hours), FOCUS courses (9 semester credit hours), and a CAPSTONE DESIGN course (3 semester credit hours), as delineated below, for a total of 33 semester credit hours. A substitution for any course in the track must be approved in writing by the Civil Engineering Undergraduate Student Services Office. Capstone design courses must include more than one civil engineering context.

<table>
<thead>
<tr>
<th>Term Semester Credit Hours</th>
<th>17</th>
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</table>

### SCIENCE Course (3 Semester Credit Hours Required)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>GEOL 320 Geology for Civil Engineers</td>
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### BREADTH Courses (18 Semester Credit Hours Required)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CVEN 307 Transportation Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 342 Materials of Construction</td>
<td>3</td>
</tr>
<tr>
<td>or CVEN 343 Portland Cement Concrete Materials for Civil Engineers</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 349 Civil Engineering Project Management</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 365 Introduction to Geotechnical Engineering</td>
<td>3</td>
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### FOCUS Courses (9 Semester Credit Hours Required)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CVEN 405 Construction Management of Field Operations</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 473 Engineering Project Estimating and Planning</td>
<td>3</td>
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</tbody>
</table>

Choose 3 Semester Credit Hours From:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN 403 Applied Civil Engineering Surveying</td>
<td>1</td>
</tr>
<tr>
<td>MGMT 309 Survey of Management</td>
<td>3</td>
</tr>
<tr>
<td>STAT 212 Principles of Statistics II</td>
<td>3</td>
</tr>
</tbody>
</table>

### CAPSTONE DESIGN Course (3 Semester Credit Hours Required)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN 400 Design Problems in Civil Engineering</td>
<td>3</td>
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</tbody>
</table>

1 CVEN 403 is a 2 semester credit hour course. Students must typically earn an additional 1 semester credit hour of Focus course credit and should consult with their advisors for guidance on appropriate courses with which to earn this credit.

**Civil Engineering - BS, Environmental Engineering Track**

The Environmental Engineering Track to fulfill the BS in Civil Engineering degree emphasizes specialized coursework in water and waste water treatment, air and water quality management, solid and hazardous wastes, ground water protection and remediation, and environmental policy. The track is appropriate for those wishing to pursue careers in protecting the natural environment from human activities, protecting human populations from the effects of adverse environmental factors and improving the environmental quality for human health and well-being.

**Program Requirements**

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

### First Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>ENGL 104 Composition and Rhetoric</td>
<td>1</td>
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<td></td>
<td>ENGR 111 Foundations of Engineering</td>
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</table>

### Second Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>CVEN 307 Transportation Engineering</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CVEN 342 Materials of Construction</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CVEN 343 Portland Cement Concrete Materials for Civil Engineers</td>
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</tr>
<tr>
<td></td>
<td>CVEN 349 Civil Engineering Project Management</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CVEN 365 Introduction to Geotechnical Engineering</td>
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### Third Year

<table>
<thead>
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<th>Term</th>
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<th>Credits</th>
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<tbody>
<tr>
<td></td>
<td>CVEN 405 Construction Management of Field Operations</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CVEN 473 Engineering Project Estimating and Planning</td>
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</tr>
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### Fourth Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CVEN 444 Structural Concrete Design</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CVEN 446 Structural Steel Design</td>
<td>3</td>
</tr>
</tbody>
</table>

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I (^{1,2})</td>
</tr>
<tr>
<td>PHYS 218</td>
<td>Mechanics (^1)</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19) (^3)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Term Semester Credit Hours:** 16

**Third Year**

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>17</td>
</tr>
<tr>
<td>CHEM 107</td>
<td>General Chemistry for Engineering Students (^{1,4})</td>
</tr>
<tr>
<td>CHEM 117</td>
<td>General Chemistry for Engineering Students Laboratory (^1)</td>
</tr>
<tr>
<td>ENGR 112</td>
<td>Foundations of Engineering II (^1)</td>
</tr>
<tr>
<td>MATH 152</td>
<td>Engineering Mathematics II (^1)</td>
</tr>
<tr>
<td>PHYS 208</td>
<td>Electricity and Optics (^1)</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19) (^3)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Term Semester Credit Hours:** 17

**Fourth Year**

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>15</td>
</tr>
<tr>
<td>CVEN 424</td>
<td>Civil Engineering Professional Practice (^6)</td>
</tr>
<tr>
<td>Technical elective (^5)</td>
<td>12</td>
</tr>
<tr>
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</table>

**Spring**

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>15</td>
</tr>
<tr>
<td>ENGR 482/PHIL 482</td>
<td>Ethics and Engineering (^6)</td>
</tr>
<tr>
<td>Technical elective (^5)</td>
<td>9</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19) (^3)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Term Semester Credit Hours:** 17

**Total Semester Credit Hours:** 95

---

A grade of C or better is required in all science, mathematics, and engineering courses taken to satisfy degree requirements.

---

1. A grade of C or better is required.
2. Entering students will be given a math placement exam. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.
3. Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.
4. BMEN, CHEN and RHEN require 8 hours of freshman chemistry, which may be satisfied by CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112; Credit by Examination (CBE) for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 plus CHEM 102/CHEM 112; or 8 hours of CBE for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112.
5. A total of 33 hours of technical electives is required. Technical electives are divided into four categories: science courses, breadth courses, focus courses, and capstone design courses. The choice of courses to be taken in each of the four categories depends on the track chosen and must be made in consultation with the student’s advisor and/or the Civil Engineering Undergraduate Student Services Office. Capstone design courses must include more than one civil engineering context.
6. All students must take at least two courses in their major that are designated as writing intensive (W). ENGR 482/PHIL 482 and CVEN 424 taken at Texas A&M satisfy this requirement. Other CVEN courses may be approved as W courses at a later date. A grade of C or better is required in these courses.
Total Program Hours 128

Environmental Engineering Track - Technical Electives

Technical electives for the BS in Civil Engineering, Environmental Engineering Track are composed of a SCIENCE course (3 semester credit hours), BREADTH courses (7-12 semester credit hours), FOCUS courses (15-20 semester credit hours), and a CAPSTONE DESIGN course (3 semester credit hours), as delineated below, for a total of 33 semester credit hours. A substitution for any course in the track must be approved in writing by the Civil Engineering Undergraduate Student Services Office, CE Building, Room 140.

Science 3
Select one of the following:
- ATMO 363 Introduction to Atmospheric Chemistry and Air Pollution
- BESC 201 Introduction to Bioenvironmental Sciences
- BIOL 113 Essentials in Biology
- GEOL 410 Hydrogeology
- GEOS 105 Introduction to Environmental Geoscience
- RENR 205 Fundamentals of Ecology

Breadth - 7 to 12 semester credit hours 1
CVEN 301 Environmental Engineering
CVEN 339 Water Resources Engineering
Select three to nine credit hours from the following:
- CVEN 342 Materials of Construction
- CVEN 349 or Portland Cement Concrete Materials for Civil Engineers
- CVEN 365 Introduction to Geotechnical Engineering
- CVEN 403 Applied Civil Engineering Surveying
- OCEN 336 Fluid Dynamics Laboratory

Select up to three credit hours from the following:
- CVEN 307 Transportation Engineering
- CVEN 349 Civil Engineering Project Management
- CVEN 444 Structural Concrete Design
- CVEN 446 Structural Steel Design

Focus Elective - 15 to 20 semester credit hours 1
Select 6 to 9 semester credit hours from the following:
- CVEN 402 Engineered Environmental Systems
- CVEN 406 Environmental Protection and Public Health
- CVEN 413 Natural Environmental Systems

Select 6 to 14 semester credit hours from the following:
- BAEN 465 Design of Biological Waste Treatment Systems
- BAEN 469 Water Quality Engineering
- BAEN 477 Air Pollution Engineering
- CVEN 423 Geomatics for Civil Engineering
- CVEN 451 Public Works Engineering
- CVEN 455 Urban Stormwater Management
- CVEN 458 Hydraulic Engineering of Water Distribution Systems
- CVEN 463 Engineering Hydrology

Capstone Design

CVEN 400 Design Problems in Civil Engineering 3

Total Semester Credit Hours 33

1 The sum of semester credit hours of Breadth and Focus courses must be at least 27.

Civil Engineering - BS, General Civil Engineering Track

The General Civil Engineering Track to fulfill the BS in Civil Engineering degree emphasizes breadth across the civil engineering field. Students take courses in all major sub-disciplines of civil engineering with an advanced focus elective allowing deeper learning in one area. The track is appropriate for a career in any area of civil engineering, with particular relevance for those interested in public works, land development, and general civil, and for those planning on further specialization in graduate studies.

Program Requirements

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

First Year

Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104 Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 111 Foundations of Engineering</td>
<td>2</td>
</tr>
<tr>
<td>MATH 151 Engineering Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 218 Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>University Core Curriculum</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 16

Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 107 General Chemistry for</td>
<td>3</td>
</tr>
<tr>
<td>Engineering Students</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 117 General Chemistry for</td>
<td>1</td>
</tr>
<tr>
<td>Engineering Students Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 112 Foundations of Engineering</td>
<td>2</td>
</tr>
<tr>
<td>MATH 152 Engineering Mathematics</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 16
<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>16</td>
</tr>
<tr>
<td>Spring</td>
<td>17</td>
</tr>
<tr>
<td>Fall</td>
<td>15</td>
</tr>
<tr>
<td>Spring</td>
<td>15</td>
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</table>

**Second Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN 207</td>
<td>Introduction to the Civil Engineering Profession</td>
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</tr>
<tr>
<td>CVEN 221</td>
<td>Engineering Mechanics: Statics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 251</td>
<td>Engineering Mathematics III</td>
<td>3</td>
</tr>
<tr>
<td>STAT 211</td>
<td>Principles of Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>COMM 205 or ENGL 210</td>
<td>Communication for Technical Professions or Technical and Business Writing</td>
<td>3</td>
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</table>

| University Core Curriculum (p. 19) | 3                     |

**Total Semester Credit Hours:** 17

**Third Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN 311</td>
<td>Fluid Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 322</td>
<td>Civil Engineering Systems</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 345</td>
<td>Theory of Structures</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 363</td>
<td>Engineering Mechanics: Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>Technical elective</td>
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<td>3</td>
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</tbody>
</table>

| University Core Curriculum (p. 19) | 3                     |

**Fourth Year**

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>15</td>
</tr>
<tr>
<td>Spring</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN 424</td>
<td>Civil Engineering Professional Practice</td>
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<tr>
<td>ENGR 482/PHIL 482</td>
<td>Ethics and Engineering</td>
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<tr>
<td>Technical elective</td>
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</tbody>
</table>

| University Core Curriculum (p. 19) | 3                     |

**Total Semester Credit Hours:** 15

A grade of C or better is required in all science, mathematics and engineering courses taken to satisfy degree requirements.

**Total Program Hours 128**

**General Civil Engineering Track - Technical Electives**

Technical electives for the BS in Civil Engineering, General Civil Engineering Track are composed of a SCIENCE course (3 semester credit hours), BREADTH courses (24 semester credit hours), a FOCUS course (3 semester credit hours), and a CAPSTONE DESIGN course (3 semester credit hours), as delineated below, for a total of 33 semester credit hours. A substitution for any course in the track must be approved in writing by the Civil Engineering Undergraduate Student Services Office, CE Building, Room 140.

**SCIENCE Course (3 Semester Credit Hours Required)**

Choose 3 Semester Credit Hours From:

- ATMO 201 Weather and Climate

A total of 33 hours of technical electives is required. Technical electives are divided into four categories: science courses, breadth courses, focus courses, and capstone design courses. The choice of courses to be taken in each of the four categories depends on the track chosen and must be made in consultation with the student’s advisor and/or the Civil Engineering Undergraduate Student Services Office. Capstone design courses must include more than one civil engineering context.

All students must take at least two courses in their major that are designated as writing intensive (W). ENGR 482/PHIL 482 and CVEN 424 taken at Texas A&M satisfy this requirement. Other CVEN courses may be approved as W courses at a later date. A grade of C or better is required in these courses.

A grade of C or better is required in all science, mathematics and engineering courses taken to satisfy degree requirements.

**Total Program Hours 128**
Civil Engineering - BS, Geotechnical Engineering Track

The Geotechnical Engineering Track to fulfill the BS in Civil Engineering degree emphasizes specialized coursework in applied soil mechanics and foundation engineering, as well as civil engineering sub-disciplines with strong geotechnical engineering connections such as structures, water resources, construction, transportation, environmental, coastal and ocean engineering. The track is appropriate for those wishing to pursue careers in engineering design and management of infrastructure in a wide array of sectors that can include energy, transportation, and water resources.

Program Requirements

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

First Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Fall</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>ENGL 104 Composition and Rhetoric</td>
<td>3</td>
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<tr>
<td></td>
<td>ENGR 111 Foundations of Engineering</td>
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</tr>
<tr>
<td></td>
<td>MATH 151 Engineering Mathematics</td>
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</tr>
<tr>
<td></td>
<td>PHYS 218 Mechanics</td>
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</tr>
<tr>
<td></td>
<td>University Core Curriculum</td>
<td>3</td>
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</table>

| Term Semester Credit Hours | 16 |

<table>
<thead>
<tr>
<th>Spring</th>
<th>Term Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 107 General Chemistry for Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 117 General Chemistry for Engineering Students</td>
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</tr>
<tr>
<td>ENGR 112 Foundations of Engineering</td>
<td>2</td>
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<tr>
<td>MATH 152 Engineering Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 208 Electricity and Optics</td>
<td>4</td>
</tr>
</tbody>
</table>

1 CVEN 403 is a 2 semester credit hour course. Students must typically earn an additional 1 semester credit hour of Focus course credit and should consult with their advisors for guidance on appropriate courses with which to earn this credit.
Second Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
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</tr>
<tr>
<td></td>
<td>CVEN 207: Introduction to the Civil Engineering Profession</td>
</tr>
<tr>
<td></td>
<td>CVEN 221: Engineering Mechanics: Statics</td>
</tr>
<tr>
<td></td>
<td>MATH 251: Engineering Mathematics III</td>
</tr>
<tr>
<td></td>
<td>STAT 211: Principles of Statistics I</td>
</tr>
<tr>
<td></td>
<td>COMM 205 or ENGL 210: Communication for Technical Professions or Technical and Business Writing</td>
</tr>
<tr>
<td></td>
<td>University Core Curriculum (p. 19)</td>
</tr>
<tr>
<td></td>
<td>Term Semester Credit Hours</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td>CVEN 250: Introduction to Graphics and Visualization Applications in Civil Engineering Design</td>
<td>2</td>
</tr>
<tr>
<td>CVEN 302: Computer Applications in Engineering and Construction</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 303: Civil Engineering Measurement</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 305: Mechanics of Materials</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 306: Materials Engineering for Civil Engineers</td>
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</tr>
<tr>
<td>MATH 308: Differential Equations</td>
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<tr>
<td></td>
<td>Term Semester Credit Hours</td>
</tr>
<tr>
<td>Third Year</td>
<td></td>
</tr>
<tr>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>CVEN 311: Fluid Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 322: Civil Engineering Systems</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 345: Theory of Structures</td>
<td>3</td>
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<tr>
<td>CVEN 363: Engineering Mechanics: Dynamics</td>
<td>3</td>
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<tr>
<td></td>
<td>Technical elective</td>
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<td>Term Semester Credit Hours</td>
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<td>Spring</td>
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<tr>
<td>Select one of the following:</td>
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</tr>
<tr>
<td></td>
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</table>

University Core Curriculum (p. 19) | 3

Total Semester Credit Hours: | 33

1. A grade of C or better is required.
2. Entering students will be given a math placement exam. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.
3. Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.
4. BMEN, CHEN and RHEN require 8 hours of freshman chemistry, which may be satisfied by CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112; Credit by Examination (CBE) for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112; or 8 hours of CBE for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112.

Fourth Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
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<tr>
<td>CVEN 424: Civil Engineering Professional Practice</td>
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</tr>
<tr>
<td>Technical elective</td>
<td>5</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Term Semester Credit Hours</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td>ENGR 482/PHIL 482: Ethics and Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Technical elective</td>
<td>5</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Term Semester Credit Hours</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours: | 95

A total of 33 hours of technical electives is required. Technical electives are divided into four categories: science courses, breadth courses, focus courses, and capstone design courses. The choice of courses to be taken in each of the four categories depends on the track chosen and must be made in consultation with the student’s advisor and/or the Civil Engineering Undergraduate Student Services Office. Capstone design courses must include more than one civil engineering context.

A grade of C or better is required in all science, mathematics and engineering courses taken to satisfy degree requirements.

Total Program Hours 128

Geotechnical Engineering Track - Technical Electives

Technical electives for the BS in Civil Engineering, Geotechnical Engineering Track are composed of a SCIENCE course (3 semester credit hours), BREADTH courses (18 semester credit hours), FOCUS courses (9 semester credit hours), and a CAPSTONE DESIGN course (3 semester credit hours), as delineated below, for a total of 33 semester credit hours. A substitution for any course in the track must be approved in writing by the Civil Engineering Undergraduate Student Services Office, CE Building, Room 140.

SCIENCE Course (3 Semester Credit Hours Required)
GEOL 320: Geology for Civil Engineers | 3

BREADTH Courses (18 Semester Credit Hours Required; All Courses in this List Should Be Taken)

<table>
<thead>
<tr>
<th>Course</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAEN 320: Engineering Thermodynamics</td>
<td>9</td>
</tr>
<tr>
<td>ECEN 215: Principles of Electrical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>MEEN 315: Principles of Thermodynamics</td>
<td>3</td>
</tr>
<tr>
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<td></td>
<td>Term Semester Credit Hours</td>
</tr>
</tbody>
</table>

A grade of C or better is required in all science, mathematics and engineering courses taken to satisfy degree requirements.
Civil Engineering - BS, Structural Engineering Track

The Structural Engineering track to fulfill the BS in Civil Engineering degree provides coursework in the areas of structural mechanics and structural analysis that equip the student to analyze and design the frameworks that support buildings, bridges, offshore installations and civil infrastructure projects. This track is appropriate for those with strong analytical and computing skills wishing to apply them in the design of engineered facilities. Structural engineers create simulation models of structural systems and use them to properly proportion the beams, columns and floor systems found in buildings and other civil projects to safely resist the forces found in their environment.

Program Requirements

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

First Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>Fall</td>
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<tr>
<td>ENGL 104 Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 111 Foundations of Engineering</td>
<td>2</td>
</tr>
<tr>
<td>MATH 151 Engineering Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 218 Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td>CHEM 107 General Chemistry for Engineering Students</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 117 General Chemistry for Engineering Students Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 112 Foundations of Engineering II</td>
<td>2</td>
</tr>
<tr>
<td>MATH 152 Engineering Mathematics II</td>
<td>4</td>
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<tr>
<td>PHYS 208 Electricity and Optics</td>
<td>4</td>
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<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
</tr>
<tr>
<td>Total Semester Credit Hours:</td>
<td>17</td>
</tr>
</tbody>
</table>

1. A grade of C or better is required.
2. Entering students will be given a math placement exam. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.
3. Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.
4. BMEN, CHEN and RHEN require 8 hours of freshman chemistry, which may be satisfied by CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112; Credit by Examination (CBE) for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 plus CHEM 102/CHEM 112; or 8 hours of CBE for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112.
### Second Year

#### Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CVEN 207</td>
<td>Introduction to the Civil Engineering Profession</td>
<td>1</td>
</tr>
<tr>
<td>CVEN 221</td>
<td>Engineering Mechanics: Statics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 251</td>
<td>Engineering Mathematics III</td>
<td>3</td>
</tr>
<tr>
<td>STAT 211</td>
<td>Principles of Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>COMM 205 or</td>
<td>Communication for Technical Professions</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 210</td>
<td>or Technical and Business Writing</td>
<td>3</td>
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<tr>
<td>University Core Curriculum (p. 19)</td>
<td></td>
<td>3</td>
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</table>

**Term Semester Credit Hours**: 16

#### Spring

<table>
<thead>
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<th>Course Code</th>
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<td>Introduction to Graphics and Visualization</td>
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<td>CVEN 302</td>
<td>Computer Applications in Engineering and Construction</td>
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<td>CVEN 303</td>
<td>Civil Engineering Measurement</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 305</td>
<td>Mechanics of Materials</td>
<td>3</td>
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<tr>
<td>CVEN 306</td>
<td>Materials Engineering for Civil Engineers</td>
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<tr>
<td>MATH 308</td>
<td>Differential Equations</td>
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**Term Semester Credit Hours**: 17

### Third Year

#### Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CVEN 311</td>
<td>Fluid Dynamics</td>
<td>3</td>
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<tr>
<td>CVEN 322</td>
<td>Civil Engineering Systems</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 345</td>
<td>Theory of Structures</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 363</td>
<td>Engineering Mechanics: Dynamics</td>
<td>3</td>
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<tr>
<td>Technical elective</td>
<td></td>
<td>3</td>
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</table>

**Term Semester Credit Hours**: 15

#### Spring

Select one of the following:

- BAEN 320 Engineering Thermodynamics 3
- ECEN 215 Principles of Electrical Engineering 3
- MEEN 315 Principles of Thermodynamics 3

Technical elective | 9

**Term Semester Credit Hours**: 15

### Fourth Year

#### Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>CVEN 424</td>
<td>Civil Engineering Professional Practice</td>
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**Term Semester Credit Hours**: 15

#### Spring

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ENGR 482/PHIL 482</td>
<td>Ethics and Engineering</td>
<td>3</td>
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<tr>
<td>Technical elective</td>
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<td>9</td>
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</tbody>
</table>

**Term Semester Credit Hours**: 17

### Total Semester Credit Hours: 95

A total of 33 hours of technical electives is required. Technical electives are divided into four categories: science courses, breadth courses, focus courses, and capstone design courses. The choice of courses to be taken in each of the four categories depends on the track chosen and must be made in consultation with the student’s advisor and/or the Civil Engineering Undergraduate Student Services Office. Capstone design courses must include more than one civil engineering context.

All students must take at least two courses in their major that are designated as writing intensive (W). ENGR 482/PHIL 482 and CVEN 424 taken at Texas A&M satisfy this requirement. Other CVEN courses may be approved as W courses at a later date. A grade of C or better is required in these courses.

A grade of C or better is required in all science, mathematics and engineering courses taken to satisfy degree requirements.

### Total Program Hours: 128

#### Structural Engineering Track - Technical Electives

Technical electives for the BS in Civil Engineering, Structural Engineering Track are composed of a SCIENCE course (3 semester credit hours), a MATH course (3 semester credit hours), BREADTH courses (15 semester credit hours), FOCUS courses (9 semester credit hours), and a CAPSTONE DESIGN course (3 semester credit hours), as delineated below, for a total of 33 semester credit hours. A substitution for any course in the track must be approved in writing by the Civil Engineering Undergraduate Student Services Office, CE Building, Room 140.

### SCIENCE Course (3 Semester Credit Hours Required)

Choose 3 Semester Credit Hours From:

- ATMO 201 Weather and Climate 3
- ATMO 363 Introduction to Atmospheric Chemistry and Air Pollution 3
- BESC 201 Introduction to Bioenvironmental Sciences 3
- BIOL 113 Essentials in Biology 3
- GEOG 203 Planet Earth 3
- GEOL 320 Essentials in Biology 3
- GEOL 410 Hydrogeology 3
- GEOS 105 Introduction to Environmental Geoscience 3
- OCNG 410 Introduction to Physical Oceanography 3
- RENR 205 Fundamentals of Ecology 3
- RENR 375 Conservation of Natural Resources 3
- SCSC 445 Soil Physics 3

### MATH Course (3 Semester Credit Hours Required)

- MATH 304 Linear Algebra 3
  or MATH 311 or Topics in Applied Mathematics I 3

### BREADTH Courses (15 Semester Credit Hours Required)

- CVEN 342 Materials of Construction 3
Civil Engineering - BS, Transportation Engineering Track

The Transportation Engineering Track to fulfill the BS in Civil Engineering degree emphasizes specialized coursework in transportation engineering areas of planning, design, and operations, as well as civil engineering sub-disciplines with strong transportation connections such as water resources, construction, and geotechnical. The track is appropriate for those wishing to pursue careers in engineering related to the planning, design, construction, operation, and maintenance of various elements of the transportation system, including roads, rail, transit, and aviation.

Program Requirements

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students must be admitted to the major or have the approval of the department.

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<tr>
<th>Fall</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104 Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 111 Foundations of Engineering I</td>
<td>2</td>
</tr>
</tbody>
</table>

| Term Semester Credit Hours | 16 |

<table>
<thead>
<tr>
<th>Spring</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 107 General Chemistry for Engineering Students</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 117 General Chemistry for Engineering Students Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 112 Foundations of Engineering II</td>
<td>2</td>
</tr>
<tr>
<td>MATH 152 Engineering Mathematics II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 208 Electricity and Optics</td>
<td>4</td>
</tr>
</tbody>
</table>

| University Core Curriculum (p. 19) | 3 |

| Total Semester Credit Hours | 33 |

1 A grade of C or better is required.
2 Entering students will be given a math placement exam. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.
3 Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.
4 BMEN, CHEN and RHEN require 8 hours of freshman chemistry, which may be satisfied by CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112; Credit by Examination (CBE) for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 plus CHEM 102/CHEM 112; or 8 hours of CBE for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112.
<table>
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<th>Course Title</th>
<th>Credits</th>
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<tr>
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<td>Materials Engineering for Civil Engineers</td>
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<td>MATH 308</td>
<td>Differential Equations</td>
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<td></td>
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**Third Year**

**Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tr>
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<td>Fluid Dynamics</td>
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<td>CVEN 345</td>
<td>Theory of Structures</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 363</td>
<td>Engineering Mechanics: Dynamics</td>
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</tr>
<tr>
<td>Technical elective 5</td>
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<tr>
<td></td>
<td><strong>Term Semester Credit Hours</strong></td>
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</tr>
</tbody>
</table>

**Spring**

Select one of the following:

- BAEN 320 Engineering Thermodynamics 3
- ECEN 215 Principles of Electrical Engineering 3
- MEEN 315 Principles of Thermodynamics 3

| Technical elective 5                          |                             | 9       |
| University Core Curriculum (p. 19) 3       |                             | 3       |
|             | **Term Semester Credit Hours**                             | **15**  |

**Fourth Year**

**Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN 424</td>
<td>Civil Engineering Professional Practice 6</td>
<td>2</td>
</tr>
<tr>
<td>Technical elective 5</td>
<td></td>
<td>12</td>
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<td>University Core Curriculum (p. 19) 3</td>
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</tr>
<tr>
<td></td>
<td><strong>Term Semester Credit Hours</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

**Spring**

ENGR 482/PHIL 482 Ethics and Engineering 6 3

| Technical elective 5                          |                             | 9       |
| University Core Curriculum (p. 19) 3       |                             | 3       |
|             | **Term Semester Credit Hours**                             | **15**  |

**Total Semester Credit Hours:** 95

---

5 A total of 33 hours of technical electives is required. Technical electives are divided into four categories: science courses, breadth courses, focus courses, and capstone design courses. The choice of courses to be taken in each of the four categories depends on the track chosen and must be made in consultation with the student’s advisor and/or the Civil Engineering Undergraduate Student Services Office. Capstone design courses must include more than one civil engineering context.

6 All students must take at least two courses in their major that are designated as writing intensive (W). ENGR 482/PHIL 482 and CVEN 424 taken at Texas A&M satisfy this requirement. Other CVEN courses may be approved as W courses at a later date. A grade of C or better is required in these courses.

A grade of C or better is required in all science, mathematics and engineering courses taken to satisfy degree requirements.

---

**Total Program Hours 128**

**Transportation Engineering Track - Technical Electives**

Technical electives for the BS in Civil Engineering, Transportation Engineering Track are composed of a SCIENCE course (3 semester credit hours), BREADTH courses (12-18 semester credit hours), FOCUS courses (9-15 semester credit hours), and a CAPSTONE DESIGN course (3 semester credit hours), as delineated below, for a total of 33 semester credit hours. A substitution for any course in the track must be approved in writing by the Civil Engineering Undergraduate Student Services Office, CE Building, Room 140.

**SCIENCE Course (3 Semester Credit Hours Required)**

Choose 3 Semester Credit Hours From:

- ATMO 201 Weather and Climate
- BESC 201 Introduction to Bioenvironmental Sciences
- GEOG 203 Planet Earth
- GEOL 320 Geology for Civil Engineers
- GEOS 105 Introduction to Environmental Geoscience

**BREADTH Courses (12-18 Semester Credit Hours Required)**

Choose 3-9 Semester Credit Hours From:

- CVEN 307 Transportation Engineering 3
- CVEN 342 Materials of Construction 3
- CVEN 343 or Portland Cement Concrete Materials for Civil Engineers
- CVEN 444 Structural Concrete Design 3
- CVEN 301 Environmental Engineering 3
- CVEN 339 Water Resources Engineering 3
- CVEN 349 Civil Engineering Project Management 3
- CVEN 365 Introduction to Geotechnical Engineering 3
- CVEN 446 Structural Steel Design 3

**FOCUS Courses (9-15 Semester Credit Hours Required)**

Choose 3-9 Semester Credit Hours From:

- CVEN 403 Applied Civil Engineering Surveying 2
- CVEN 417 Bituminous Materials
- CVEN 418 Highway Materials and Pavement Design
- CVEN 423 Geomatics for Civil Engineering
- CVEN 451 Public Works Engineering
- CVEN 455 Urban Stormwater Management
- ISEN 430 Human Factors and Ergonomics

**CAPSTONE DESIGN Course (3 Semester Credit Hours Required)**

CVEN 456 Highway Design 3

1 The sum of semester credit hours of Breadth and Focus courses must be at least 27.
Differential Equations

must be admitted to the major or have the approval of the department. Before commencing course work in the major, students should refer to the specific curriculum for each major for other courses are met. In addition to the freshman year curriculum listed below, however, should be made with care to ensure that prerequisites for all courses are met in any semester. Deviations from the prescribed course sequence, that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

Civil Engineering - BS, Water Resources Engineering Track

The Water Resources Engineering Track to fulfill the BS in Civil Engineering degree emphasizes specialized coursework in applied hydraulics and hydrology as well as civil engineering sub-disciplines with strong water resources connections such as environmental, transportation, geotechnical, and coastal engineering. The track is appropriate for those wishing to pursue careers in engineering design and management for water quantity and quality issues.

Program Requirements

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

First Year

**Fall**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
<th>Departmental Courses</th>
<th>University Core Curriculum (p. 19)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104</td>
<td>3</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 111</td>
<td>2</td>
<td>Foundations of Engineering</td>
<td>2</td>
</tr>
<tr>
<td>MATH 151</td>
<td>4</td>
<td>Engineering Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 218</td>
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<td>Mechanics</td>
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</tr>
<tr>
<td>University Core Curriculum</td>
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<td></td>
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</tr>
</tbody>
</table>

**Spring**

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<th>University Core Curriculum (p. 19)</th>
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</thead>
<tbody>
<tr>
<td>CHEM 107</td>
<td>3</td>
<td>General Chemistry for Engineering</td>
<td>3</td>
</tr>
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<td>General Chemistry for Engineering Students</td>
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</tr>
<tr>
<td>ENGR 112</td>
<td>2</td>
<td>Foundations of Engineering Students Laboratory</td>
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<tr>
<td>MATH 152</td>
<td>2</td>
<td>Engineering Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 208</td>
<td>4</td>
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Second Year

**Fall**

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**Spring**

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<td>CVEN 306</td>
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**Third Year**

**Fall**

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</tr>
<tr>
<td>CVEN 345</td>
<td>3</td>
<td>Theory of Structures</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 363</td>
<td>3</td>
<td>Engineering Mechanics: Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>Technical elective</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Spring**

Select one of the following:
BAEN 320  Engineering Thermodynamics
ECEN 215  Principles of Electrical Engineering
MEEN 315  Principles of Thermodynamics

Technical elective 9
University Core Curriculum (p. 19) 3

**Term Semester Credit Hours** 15

**Fourth Year**

**Fall**
CVEN 424  Civil Engineering Professional Practice 6
Technical elective 5
University Core Curriculum (p. 19) 3

**Term Semester Credit Hours** 17

**Spring**
ENGR 482/PHIL 482  Ethics and Engineering 6
Technical elective 5
University Core Curriculum (p. 19) 3

**Term Semester Credit Hours** 15

**Total Semester Credit Hours:** 95

5 A total of 33 hours of technical electives is required. Technical electives are divided into four categories: science courses, breadth courses, focus courses, and capstone design courses. The choice of courses to be taken in each of the four categories depends on the track chosen and must be made in consultation with the student’s advisor and/or the Civil Engineering Undergraduate Student Services Office. Capstone design courses must include more than one civil engineering context.

6 All students must take at least two courses in their major that are designated as writing intensive (W). ENGR 482/PHIL 482 and CVEN 424 taken at Texas A&M satisfy this requirement. Other CVEN courses may be approved as W courses at a later date. A grade of C or better is required in these courses.

A grade of C or better is required in all science, mathematics and engineering courses taken to satisfy degree requirements.

**Total Program Hours 128**

**Water Resources Engineering Track - Technical Electives**

Technical electives for the BS in Civil Engineering, Water Resources Engineering Track are composed of a SCIENCE course (3 semester credit hours), BREADTH courses (15 semester credit hours), FOCUS courses (12 semester credit hours), and a CAPSTONE DESIGN course (3 semester credit hours), as delineated below, for a total of 33 semester credit hours. A substitution for any course in the track must be approved in writing by the Civil Engineering Undergraduate Student Services Office, CE Building, Room 140.

**SCIENCE Course (3 Semester Credit Hours Required)**
Choose 3 Semester Credit Hours From:
- ATM 201  Weather and Climate
- BIOL 206  Introductory Microbiology

**BREADTH Courses (15 Semester Credit Hours Required)**
- CVEN 301  Environmental Engineering
- CVEN 307  Transportation Engineering
- CVEN 339  Water Resources Engineering
- CVEN 342  Materials of Construction
- CVEN 436  or CVEN 434  or Portland Cement Concrete Materials for Civil Engineers
- CVEN 365  Introduction to Geotechnical Engineering

**FOCUS Courses (12 Semester Credit Hours Required)**
Choose 6-9 Semester Credit Hours From:
- CVEN 455  Urban Stormwater Management
- CVEN 458  Hydraulic Engineering of Water Distribution Systems
- CVEN 463  Engineering Hydrology

Choose 3-6 Semester Credit Hours From:
- CVEN 402  Engineered Environmental Systems
- CVEN 403  Applied Civil Engineering Surveying
- CVEN 406  Environmental Protection and Public Health
- CVEN 413  Natural Environmental Systems
- CVEN 423  Geomatics for Civil Engineering
- CVEN 454  Urban Planning for Engineers
- OCEN 336  Fluid Dynamics Laboratory
- OCEN 400  Basic Coastal Engineering

**CAPSTONE DESIGN Course (3 Semester Credit Hours Required)**
- CVEN 400  Design Problems in Civil Engineering

1 CVEN 403 is a 2 semester credit hour course. Students must typically earn an additional 1 semester credit hour of Focus course credit and should consult with their advisors for guidance on appropriate courses with which to earn this credit.

**Ocean Engineering - BS**

The ocean engineering curriculum includes courses in written communication skills, language, philosophy and culture, social sciences and American heritage to ensure a well-rounded education. Courses that directly apply to ocean engineering include: coastal engineering, dynamics of ocean systems, engineering design of offshore and coastal systems, fluid mechanics, marine hydrodynamics, naval architecture, numerical methods, ocean engineering laboratory, ocean wave mechanics, oceanography, offshore and coastal structures, underwater acoustics, and underwater and moored system design.

**Program Requirements**

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing
a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

### First Year

**Fall**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104 Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 111 Foundations of Engineering I</td>
<td>2</td>
</tr>
<tr>
<td>MATH 151 Engineering Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 218 Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Semester Credit Hours:** 16

**Spring**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 107 General Chemistry for Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 117 General Chemistry for Engineering</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 112 Foundations of Engineering II</td>
<td>2</td>
</tr>
<tr>
<td>MATH 152 Engineering Mathematics II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 208 Electricity and Optics</td>
<td>4</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Semester Credit Hours:** 16

**Total Semester Credit Hours:** 33

1. A grade of C or better is required.
2. Entering students will be given a math placement exam. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.
3. Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.
4. BMEN, CHEN and RHEN require 8 hours of freshman chemistry, which may be satisfied by CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112; Credit by Examination (CBE) for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 plus CHEM 102/CHEM 112; or 8 hours of CBE for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112.

### Second Year

**Fall**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN 221 Engineering Mechanics: Statics</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 250 Introduction to Graphics and Visualization</td>
<td>2</td>
</tr>
<tr>
<td>MATH 251 Engineering Mathematics III</td>
<td>3</td>
</tr>
<tr>
<td>STAT 211 Principles of Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Semester Credit Hours:** 17

**Spring**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN 305 Mechanics of Materials</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 306 Materials Engineering for Civil Engineers</td>
<td>3</td>
</tr>
<tr>
<td>MATH 308 Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>MEEN 315 or ECEN 215 Principles of Thermodynamics or Principles of Electrical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>OCEN 201 Introduction to Ocean Engineering</td>
<td>3</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Semester Credit Hours:** 16

### Third Year

**Fall**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN 302 Computer Applications in Engineering and Construction</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 311 Fluid Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 345 Theory of Structures</td>
<td>3</td>
</tr>
<tr>
<td>OCEN 336 Fluid Dynamics Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>OCEN 401 or OCNG 410 Underwater Acoustics for Ocean Engineers</td>
<td>3</td>
</tr>
<tr>
<td>COMM 205 or ENGL 210 Communication for Technical Professions</td>
<td>3</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Semester Credit Hours:** 16

**Spring**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVEN 363 Engineering Mechanics: Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>CVEN 365 Introduction to Geotechnical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 482/PHIL 482 Ethics and Engineering</td>
<td>3</td>
</tr>
<tr>
<td>OCEN 300 Ocean Engineering Wave Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>OCEN 362 Hydromechanics</td>
<td>3</td>
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</table>

**Semester Credit Hours:** 15

### Fourth Year

**Fall**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCEN 403 Dynamics of Offshore Structures</td>
<td>3</td>
</tr>
<tr>
<td>OCEN 400 Basic Coastal Engineering</td>
<td>3</td>
</tr>
<tr>
<td>OCEN 401 Underwater Acoustics for Ocean Engineers</td>
<td>3</td>
</tr>
<tr>
<td>OCEN 402 Principles of Naval Architecture</td>
<td>3</td>
</tr>
<tr>
<td>OCEN 481 Seminar</td>
<td>1</td>
</tr>
<tr>
<td>Technical elective</td>
<td>3</td>
</tr>
</tbody>
</table>

**Semester Credit Hours:** 16

**Spring**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCEN 407 Design of Ocean Engineering Facilities</td>
<td>4</td>
</tr>
<tr>
<td>OCEN 410 Ocean Engineering Laboratory</td>
<td>1</td>
</tr>
</tbody>
</table>

**Semester Credit Hours:** 16
Technical elective \(^6\)  
University Core Curriculum (p. 19) \(^3\)

<table>
<thead>
<tr>
<th>Term Semester Credit Hours</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Semester Credit Hours:</td>
<td>98</td>
</tr>
</tbody>
</table>

\(^5\) All students must take at least two courses in their major that are designated as writing intensive (W). ENGR 482/PHIL 482 and OCEN 410 taken at Texas A&M satisfy this requirement.

\(^6\) The technical elective program must be approved by the department head or the undergraduate advisor. Technical electives are chosen from the approved technical elective list, and at least 3 credit hours must be engineering design.

A grade of C or better is required in all science, mathematics and engineering courses taken to satisfy degree requirements.

**Total Program Hours 131**

**Department of Computer Science & Engineering**

**Computer Science**

The curriculum in computer science is designed to prepare students to enter the rapidly expanding computer field. Curricula and courses are based upon recommendations by the Institute of Electrical and Electronic Engineering Computer Society and the Association for Computing Machinery. The Computer Science program is accredited by the Computing Accreditation Commission of ABET, www.abet.org.

**Program Mission**

The mission of the computer science program at Texas A&M University is to prepare intellectual, professional, and ethical graduates, capable of meeting challenges in the field of Computer Science; and to coordinate with other parts of the university to facilitate the effective use of educational resources by sharing cross-disciplinary courses.

**Program Objectives**

1. Graduates who choose to enter the workforce will become productive and valuable professionals in their field.
2. Graduates who choose to pursue advanced degrees will be able to gain admission to graduate programs and will become successful graduate students.
3. Graduates will understand the importance of lifelong learning to adapt to new technologies, tools and methodologies with the ability to respond to a changing world.

The four-year undergraduate curriculum in computer science at Texas A&M provides a sound preparation in computing, as well as in science, mathematics, English, and statistics. Students take a broad set of core computer science courses in the first two years, which exposes them to the main concepts in computing. During the last two years, students take elective computer science courses drawn from four tracks (theory, computer systems, software, and information and intelligent systems) to provide both breadth and depth. The electives can be used to tailor the curriculum to match the student’s interests. Graduate courses may be taken by qualified students for some of the electives.

A major in computer science includes a 12-hour area of concentration. This allows students to design a course of study that complements their computer science coursework and takes advantage of opportunities offered by other departments across the University.

The Department of Computer Science and Engineering has significant computer resources of its own, shares resources with other departments and makes use of University systems. Departmental resources for students include modern workstations; large computer servers; disk servers; and massively parallel systems as well as network access to the University supercomputers.

Students must submit a formal degree plan during the first full semester in the department. Departmental advisors are available for assistance.

**Computer Engineering**

The Computer Engineering curricula provide a balanced view of hardware, software, hardware-software trade-offs, analysis, design, and implementation techniques. It is a dynamic and broadly interdisciplinary field that continues to experience rapid professional growth that impacts every area of human endeavor. The Computer Engineering program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org.

**Program Mission**

The mission of the Computer Engineering program is to provide students with an education that ensures an excellent understanding of hardware and software systems and the necessary system design and development skills, and that fosters professional curiosity and imagination that drives them throughout their career.

The program will stimulate and challenge the students with an exceptional, highly motivated faculty that shares its knowledge and excitement about Computer Engineering, well designed undergraduate and graduate curricula, research opportunities at all levels, and a first-class educational infrastructure.

The program strives to produce graduates who are well prepared to excel in industry, academia and government, and who will take on leadership roles in shaping the technological landscape of the future.

**Program Objectives**

In support of this mission, the Computer Engineering program has defined the following educational objectives:

1. Graduates of the program will have the necessary knowledge, both in breadth and depth, to pursue the practice, or advanced study, of Computer Engineering.
2. Graduates of the program will understand the importance of life-long learning, and be prepared to learn and understand new technological developments in their field.
3. Graduates of the program will understand the technical, social and ethical context of their engineering contributions.
4. Graduates of the program will develop the communication, teamwork, and leadership skills necessary to carry on the legacy of excellence of an Aggie Engineer.

The program periodically evaluates these objectives and assesses the level at which they are met. Input in this ongoing effort is provided by alumni, employers and recruiters, the faculty, and by external advisors to the program. This feedback drives the continuous improvement both of
individual courses and of the overall curriculum. For more information on this process contact the Computer Engineering Program website.

Throughout this program, the student works with state-of-the-art computers and laboratory equipment and is exposed to the most recent analytical techniques and technological developments. Significant association with the program’s faculty, who are actively engaged in research and professional consulting activities, serves to acquaint the student with the opportunities and rewards available to the practicing Computer Engineering professional.

**Majors**

- Bachelor of Science in Computer Science (p. 328)
- Bachelor of Science in Computer Engineering, Computer Science Track (p. 327)

**Minors**

- Computer Science Minor (p. 329)

## Computer Engineering - BS, Computer Science Track

The curriculum is designed to cover the engineering aspects of both hardware and software—a total computer systems perspective. All computer engineering students take courses in the following areas: electrical circuits, electronics, digital circuits, computer architecture ranging from microcomputers to mainframes, interfacing, programming languages ranging from assembler to high level, data structures, analysis of algorithms, operating systems, software engineering and microcomputer systems. A solid foundation in the basic sciences of physics, chemistry and mathematics is used to support these courses.

There are two distinct tracks in this curriculum, the **Electrical Engineering Track** and the **Computer Science Track**, both culminating in the same Computer Engineering degree. The tracks are substantially similar, each providing a broad coverage of the computer engineering discipline, but each has a slightly different emphasis. Note that students in either track can take courses from the other as electives, or they can use their electives to further specialize within their own track. Although students are required to select a track immediately upon entering the Computer Engineering program, it is usually possible to change tracks as late as the junior year.

The Computer Science track of the Computer Engineering degree provides students the freedom to enhance their knowledge in the broad range of topics comprising Computer Engineering: computer networks, computer architecture, artificial intelligence, computer graphics, robotics, real-time computing, computer languages, microcomputers, VLSI, and large-scale hardware and software systems. The track is primarily administered by the Department of Computer Science and Engineering and encompasses nearly all of the core material of the Computer Science degree, but its greater emphasis on design and engineering fundamentals prepares the student for registration as a professional engineer.

### Program Requirements

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

#### First Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
</tr>
<tr>
<td>ENGR 111</td>
<td>Foundations of Engineering I</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
</tr>
<tr>
<td>PHYS 218</td>
<td>Mechanics</td>
</tr>
<tr>
<td>University Core Curriculum</td>
<td>(p. 19)</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td>CHEM 107</td>
<td>General Chemistry for Engineering Students</td>
</tr>
<tr>
<td>CHEM 117</td>
<td>General Chemistry for Engineering Students Laboratory</td>
</tr>
<tr>
<td>ENGR 112</td>
<td>Foundations of Engineering II</td>
</tr>
<tr>
<td>MATH 152</td>
<td>Engineering Mathematics II</td>
</tr>
<tr>
<td>PHYS 208</td>
<td>Electricity and Optics</td>
</tr>
<tr>
<td>University Core Curriculum</td>
<td>(p. 19)</td>
</tr>
<tr>
<td><strong>Total Semester Credit Hours</strong></td>
<td>33</td>
</tr>
</tbody>
</table>

1. A grade of C or better is required.
2. Entering students will be given a math placement exam. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.
3. Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.
4. BMEN, CHEN and RHEN require 8 hours of freshman chemistry, which may be satisfied by CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112; Credit by Examination (CBE) for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 plus CHEM 102/CHEM 112; or 8 hours of CBE for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112.
## Second Year

### Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCE 121</td>
<td>Introduction to Program Design and Concepts&lt;sup&gt;1&lt;/sup&gt;</td>
<td>4</td>
</tr>
<tr>
<td>CSCE 222/ECEN 222</td>
<td>Discrete Structures for Computing&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3</td>
</tr>
<tr>
<td>ECEN 248</td>
<td>Introduction to Digital Systems Design&lt;sup&gt;1&lt;/sup&gt;</td>
<td>4</td>
</tr>
<tr>
<td>MATH 251</td>
<td>Engineering Mathematics III&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3</td>
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<tr>
<td>Select one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
<td>3</td>
</tr>
<tr>
<td>COMM 205</td>
<td>Communication for Technical Professions</td>
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<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
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</table>

**Term Semester Credit Hours:** 17

### Spring

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCE 221</td>
<td>Data Structures and Algorithms&lt;sup&gt;1&lt;/sup&gt;</td>
<td>4</td>
</tr>
<tr>
<td>ECEN 214</td>
<td>Electrical Circuit Theory&lt;sup&gt;1&lt;/sup&gt;</td>
<td>4</td>
</tr>
<tr>
<td>MATH 308</td>
<td>Differential Equations&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3</td>
</tr>
<tr>
<td>STAT 211</td>
<td>Principles of Statistics&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)&lt;sup&gt;3&lt;/sup&gt;</td>
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<td>3</td>
</tr>
</tbody>
</table>

**Term Semester Credit Hours:** 17

## Third Year

### Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCE 313</td>
<td>Introduction to Computer Systems&lt;sup&gt;1&lt;/sup&gt;</td>
<td>4</td>
</tr>
<tr>
<td>CSCE 350/ECEN 350</td>
<td>Computer Architecture and Design&lt;sup&gt;1&lt;/sup&gt;</td>
<td>4</td>
</tr>
<tr>
<td>CSCE 481</td>
<td>Seminar&lt;sup&gt;1&lt;/sup&gt;</td>
<td>1</td>
</tr>
<tr>
<td>ECEN 314</td>
<td>Signals and Systems&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3</td>
</tr>
<tr>
<td>MATH 311</td>
<td>Topics in Applied Mathematics&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3</td>
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</table>

**Term Semester Credit Hours:** 15

### Spring

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCE 315</td>
<td>Programming Studio&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3</td>
</tr>
<tr>
<td>CSCE 462</td>
<td>Microcomputer Systems&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3</td>
</tr>
<tr>
<td>ECEN 325</td>
<td>Electronics&lt;sup&gt;1&lt;/sup&gt;</td>
<td>4</td>
</tr>
<tr>
<td>ECEN 454</td>
<td>Digital Integrated Circuit Design&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)&lt;sup&gt;3&lt;/sup&gt;</td>
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**Term Semester Credit Hours:** 15

## Fourth Year

### Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR 482/PHIL 482</td>
<td>Ethics and Engineering</td>
<td>3</td>
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<tr>
<td>Area elective&lt;sup&gt;5&lt;/sup&gt;</td>
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<tr>
<td>Area elective&lt;sup&gt;6&lt;/sup&gt;</td>
<td></td>
<td>3</td>
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</table>

**Term Semester Credit Hours:** 15

### Spring

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CSCE 483</td>
<td>Computer Systems Design&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3</td>
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<tr>
<td>Area elective&lt;sup&gt;5&lt;/sup&gt;</td>
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**Term Semester Credit Hours:** 15

## Second Year

### Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CSCE 312</td>
<td>Computer Organization&lt;sup&gt;1&lt;/sup&gt;</td>
<td>4</td>
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<tr>
<td>CSCE 314</td>
<td>Programming Languages&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3</td>
</tr>
<tr>
<td>MATH 304</td>
<td>Linear Algebra&lt;sup&gt;1&lt;/sup&gt;</td>
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<tr>
<td>Concentration area elective&lt;sup&gt;3&lt;/sup&gt;</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

**Term Semester Credit Hours:** 15

---

**Total Program Hours 128**

**Computer Science - BS**

The four-year undergraduate curriculum in computer science at Texas A&M provides a sound preparation in computing, as well as in science, mathematics, English, and statistics. Students take a broad set of core computer science courses in the first two years, which exposes them to the main concepts in computing. During the last two years, students take elective computer science courses drawn from four tracks (algorithms and theory, computer systems, software, and information and intelligent systems) to provide both breadth and depth. The electives can be used to tailor the curriculum to match the student's interests. Graduate courses may be taken by qualified students for some of the electives.

A major in computer science includes a 12-hour area of concentration. This allows students to design a course of study that complements their computer science coursework and takes advantage of opportunities offered by other departments across the University.

### Program Requirements

#### First Year

### Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCE 121</td>
<td>Introduction to Program Design and Concepts&lt;sup&gt;1&lt;/sup&gt;</td>
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<tr>
<td>CSCE 181</td>
<td>Introduction to Computing&lt;sup&gt;1&lt;/sup&gt;</td>
<td>1</td>
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<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric&lt;sup&gt;1&lt;/sup&gt;</td>
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</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I&lt;sup&gt;1&lt;/sup&gt;</td>
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**Term Semester Credit Hours:** 16

### Spring

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CSCE 221</td>
<td>Data Structures and Algorithms&lt;sup&gt;1&lt;/sup&gt;</td>
<td>4</td>
</tr>
<tr>
<td>CSCE 222/ECEN 222</td>
<td>Discrete Structures for Computing&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3</td>
</tr>
<tr>
<td>MATH 152</td>
<td>Engineering Mathematics II&lt;sup&gt;1&lt;/sup&gt;</td>
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**Term Semester Credit Hours:** 16

#### Fourth Year

### Fall

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<tr>
<td>ENGR 482/PHIL 482</td>
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<tr>
<td>Area elective&lt;sup&gt;5&lt;/sup&gt;</td>
<td></td>
<td>9</td>
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<tr>
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**Term Semester Credit Hours:** 15

### Spring

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCE 483</td>
<td>Computer Systems Design&lt;sup&gt;1&lt;/sup&gt;</td>
<td>3</td>
</tr>
<tr>
<td>Area elective&lt;sup&gt;5&lt;/sup&gt;</td>
<td></td>
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</tbody>
</table>

**Term Semester Credit Hours:** 15

---

5. Fifteen hours of area electives chosen in consultation with academic advisor.
6. Approved by student's advisor.
Computer Science - Minor

The Department of Computer Science and Engineering offers a minor in Computer Science.

Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSCE 121</td>
<td>Introduction to Program Design and Concepts</td>
<td>4</td>
</tr>
<tr>
<td>CSCE 221</td>
<td>Data Structures and Algorithms</td>
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<td>CSCE 222</td>
<td>Discrete Structures for Computing</td>
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<tr>
<td>ECEN 222</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>CSCE 312</td>
<td>Computer Organization</td>
<td>4</td>
</tr>
<tr>
<td>CSCE 313</td>
<td>Introduction to Computer Systems</td>
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<tr>
<td>CSCE 314</td>
<td>Programming Languages</td>
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</tr>
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<td>CSCE 315</td>
<td>Programming Studio</td>
<td>4</td>
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<td>CSCE 316</td>
<td>Programming Language</td>
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</tr>
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<td>CSCE 482</td>
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</tr>
<tr>
<td>ENGR 482/PHIL</td>
<td>Ethics and Engineering</td>
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<tr>
<td>Elective</td>
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<tr>
<td>Science elective</td>
<td></td>
<td>4</td>
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</tbody>
</table>

Total Semester Credit Hours: 18

Students must make a grade of "C" or better in all courses.

Completion of lower-level courses with GPA of 2.75 or better required before application to the minor.

Department of Electrical & Computer Engineering

Electrical engineers develop and apply the theories of electricity, electronics and electromagnetics to analyze and design systems which generate or use electricity. Examples of such systems are those for power generation and transmission, computation, communication, automatic control and instrumentation. The devices that practicing engineers work with and design include integrated circuits (VLSI), waveguides, antennas, computers and other digital systems, rotating machines and motor drives, lasers and optical fibers.

The curriculum is designed to prepare the undergraduate for work in the highly diverse electrical engineering profession. A solid foundation in physics, chemistry and mathematics is used to support courses in the fundamentals of electrical engineering. The use of computers is integrated throughout the curriculum, and basic studies in circuits, electronics, electromagnetic fields and digital logic lead to a flexible program of electives in the junior and senior year. Electives may be chosen from the broad categories of controls/communications/signal processing, computer engineering, electronics, electro-physics/electro-optics/microwaves, power systems/power electronics, and biomedical imaging/sensing and systems.
Laboratory work is structured to first familiarize the student with the basic concepts and then to apply these concepts to engineering problems.

Students who expect to enroll in electrical engineering after attending another college or university should note that there is a five-semester sequence of electrical engineering courses in the curriculum. If the prerequisites are satisfied, transfer students may complete this sequence in two years and one summer session.

**Educational Program Objectives**

Activities of the Electrical and Computer Engineering Department including research, teaching, and professional and community service revolve around the threefold mission of the department:

- To create new knowledge and challenge young minds by participation in the process of discovery and invention;
- To educate electrical and computer engineers with a solid background of fundamentals, stretching their imagination and preparing them for an exciting future;
- To serve the society through research, education and outreach activities.

Undergraduate education plays a major part in helping the department to achieve its mission. As such, the department has established a set of undergraduate educational program objectives which will help to insure that the mission of the department is upheld. These program objectives represent a concise, measurable set of descriptions of what the department is trying to accomplish through its undergraduate program. Furthermore, these objectives are designed to be observable in our graduates in a time window of two to five years after graduation from the program.

The Department of Electrical and Computer Engineering’s three Undergraduate Educational Program Objectives are as follows:

1. Objective 1—Graduates who choose to pursue a career in industry or government will become productive and valuable engineers.
2. Objective 2—Graduates who choose to pursue advanced degrees will be able to gain admission to graduate programs and will become successful graduate students.
3. Objective 3—in keeping with the legacy of an Aggie Engineer, graduates will be successful in attaining positions of leadership in their professional careers.

The extent to which the department is meeting these objectives is periodically assessed through such instruments as alumni surveys, employer/recruiter surveys, graduating senior surveys and Fundamentals of Engineering exam results. Our goal is to continually improve the program’s ability to meet these educational objectives. The electrical engineering curriculum and individual course contents are periodically evaluated and adjusted in order to further support our ability to achieve the program objectives. The Electrical Engineering program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org. More information on these efforts can be found at the Department of Electrical and Computer Engineering (http://engineering.tamu.edu/electrical) website by clicking on the link for ABET Accreditation. The department welcomes comments and suggestions from any interested individuals regarding the above program objectives and/or how the department can better meet these objectives.

Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

**Faculty**

- Annapareddy, Narasimha, Professor
  Electrical & Computer Eng
  PhD, University of Illinois, 1990
- Balog, Robert S, Associate Professor
  Electrical & Computer Eng
  PhD, University of Illinois at Urbana-Champaign, 2006
- Begovic, Miroslav M, Professor
  Electrical & Computer Eng
  PhD, Virginia Polytechnic Institute and State University, 1989
- Bhattacharyya, S P, Professor
  Electrical & Computer Eng
  PhD, Rice University, 1971
- Biard, James R, Tees Research Professor
  Electrical & Computer Eng
  PhD, Texas A&M University, 1957
- Bosshard, John C, Lecturer
  Electrical & Computer Eng
  PhD, Texas A&M University, 2012
- Braga Neto, Ulisses, Associate Professor
  Electrical & Computer Eng
  PhD, John Hopkins University, 2002
- Butler-Purry, Karen L, Professor
  Electrical & Computer Eng
  PhD, Howard University, 1994
- Cantrell, Pierce E, Associate Professor
  Electrical & Computer Eng
  PhD, Georgia Institute of Technology, 1981
- Chamberland-Tremblay, Jean-Francois, Associate Professor
  Electrical & Computer Eng
  PhD, University of Illinois, 2004
- Chang, Kai, Professor
  Electrical & Computer Eng
  PhD, University of Michigan, 1976
- Choi, Seong G, Associate Professor
  Electrical & Computer Eng
  PhD, University of Illinois at Urbana-Champaign, 1994
- Cui, Shuguang, Professor
  Electrical & Computer Eng
  PhD, Stanford University, 2005
- Datta, Aniruddha, Professor
  Electrical & Computer Eng
  PhD, University of Southern California, 1991
- Dougherty, Edward R, Distinguished Professor
  Electrical & Computer Eng
  PhD, Rutgers State University of New Jersey, 1974
- Duffield, Nicholas G, Professor
  Electrical & Computer Eng
  PhD, Queen Mary College, Univ. of London, 1987
Ehsani, Mehrdad, Professor  
Electrical & Computer Eng  
PhD, University of Wisconsin-Madison, 1981  

Eknoyan, Ohannes, Professor  
Electrical & Computer Eng  
PhD, Columbia University, 1975  

Enjeti, Prasad N, Professor  
Electrical & Computer Eng  
PhD, Concordia University, Montreal, Canada, 1984  

Entesari, Kamran, Associate Professor  
Electrical & Computer Eng  
PhD, University of Michigan, 2006  

Georghiades, Costas N, Professor  
Electrical & Computer Eng  
DSc, Washington University in St. Louis, 1985  
PhD, Washington University in St. Louis, 1985  

Gratz, Paul V, Associate Professor  
Electrical & Computer Eng  
PhD, University of Texas, 2008  

Han, Arum, Associate Professor  
Electrical & Computer Eng  
PhD, Georgia Institute of Technology, 2005  

Harris, Harlan R, Associate Professor  
Electrical & Computer Eng  
PhD, Texas Tech University, 2003  

Hemmer, Philip R, Professor  
Electrical & Computer Eng  
PhD, Massachusetts Institute of Technology, 1984  

Hou, I-Hong, Assistant Professor  
Electrical & Computer Eng  
PhD, University of Illinois, 2011  

Hoyos, Sebastian, Associate Professor  
Electrical & Computer Eng  
PhD, University of Delaware, 2004  

Hu, Jiang, Professor  
Electrical & Computer Eng  
PhD, University of Minnesota, 2001  

Huang, Garn M, Professor  
Electrical & Computer Eng  
DSc, Washington University in St. Louis, 1980  
PhD, Washington University in St. Louis, 1980  

Huff, Gregory H, Associate Professor  
Electrical & Computer Eng  
PhD, University of Illinois, 2006  

Ji, Jim X, Associate Professor  
Electrical & Computer Eng  
PhD, University of Illinois, 2003  

Kameoka, Jun, Associate Professor  
Electrical & Computer Eng  
PhD, Cornell University, 2002  

Karsilayan, Aydin I, Associate Professor  
Electrical & Computer Eng  
PhD, Portland State University, 2000  

Kezunovic, Mladen, Professor  
Electrical & Computer Eng  
PhD, University of Kansas, 1980  

Khatri, Sunil P, Professor  
Electrical & Computer Eng  
PhD, University of California, Berkeley, 1999  

Kish, Laszlo B, Professor  
Electrical & Computer Eng  
PhD, Uppsala University, Sweden, 1994  

Kumar, Panganamala R, Distinguished Professor  
Electrical & Computer Eng  
DSc, Washington University in St. Louis, 1977  

Li, Peng, Professor  
Electrical & Computer Eng  
PhD, Carnegie Mellon University, 2003  

Liu, Tie, Associate Professor  
Electrical & Computer Eng  
PhD, University of Illinois, 2006  

Lu, Mi, Professor  
Electrical & Computer Eng  
PhD, Rice University, 1987  

Madsen, Christi K, Professor  
Electrical & Computer Eng  
PhD, Rutgers State University of New Jersey, 1996  

Michalski, Krzysztof A, Associate Professor  
Electrical & Computer Eng  
PhD, University of Kentucky, 1981  

Miller, Scott L, Professor  
Electrical & Computer Eng  
PhD, University of California, San Diego, 1988  

Mohammad, Muneer, Lecturer  
Electrical & Computer Eng  
PhD, Texas A&M University, 2014  

Narayanan, Krishna R, Professor  
Electrical & Computer Eng  
PhD, Georgia Institute of Technology, 1998  

Nevels, Robert D, Professor  
Electrical & Computer Eng  
PhD, University of Mississippi, 1979  

Palermo, Samuel M, Associate Professor  
Electrical & Computer Eng  
PhD, Stanford University, 2007  

Qian, Xiaoning, Assistant Professor  
Electrical & Computer Eng  
PhD, Yale University, 2005
The curriculum is designed to cover the engineering aspects of both hardware and software—a total computer systems perspective. All computer engineering students take courses in the following areas: electrical circuits, electronics, digital circuits, computer architecture ranging from microcomputers to mainframes, interfacing, programming languages ranging from assembler to high level, data structures, analysis of algorithms, operating systems, software engineering and microcomputer
systems. A solid foundation in the basic sciences of physics, chemistry and mathematics is used to support these courses.

There are two distinct tracks in this curriculum, the Electrical Engineering Track and the Computer Science Track, both culminating in the same Computer Engineering degree. The tracks are substantially similar, each providing a broad coverage of the computer engineering discipline, but each has a slightly different emphasis. Note that students in either track can take courses from the other as electives, or they can use their electives to further specialize within their own track. Although students are required to select a track immediately upon entering the Computer Engineering program, it is usually possible to change tracks as late as the junior year.

The Electrical Engineering track of the Computer Engineering degree places stronger emphasis on digital Very Large Scale Integrated (VLSI) circuits and systems, microprocessor interfacing and system design, and computer system architecture and design. The track is primarily administered by the Department of Electrical and Computer Engineering and is designed to encompass nearly all of the core material of the Electrical Engineering degree but provides much more depth in computing than is possible within the context of an Electrical Engineering degree.

Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

Program Requirements

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

### First Year

#### Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
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<tr>
<td>ENGR 111</td>
<td>Foundations of Engineering I</td>
<td>2</td>
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<td>MATH 151</td>
<td>Engineering Mathematics I</td>
<td>4</td>
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<td>PHYS 218</td>
<td>Mechanics</td>
<td>4</td>
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<tr>
<td>University Core Curriculum (p. 19)</td>
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<tr>
<td>Total Semester Credit Hours</td>
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### Spring

<table>
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<th>Description</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CHEM 107</td>
<td>General Chemistry for Engineering Students</td>
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<td>CSCE 121</td>
<td>Introduction to Program Design and Concepts</td>
<td>4</td>
</tr>
<tr>
<td>CSCE 222/ECEN 222</td>
<td>Discrete Structures for Computing</td>
<td>3</td>
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<tr>
<td>ECEN 248</td>
<td>Introduction to Digital Systems Design</td>
<td>4</td>
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<tr>
<td>MATH 251</td>
<td>Engineering Mathematics III</td>
<td>3</td>
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<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
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</tr>
<tr>
<td>COMM 205</td>
<td>Communication for Technical Professions</td>
<td></td>
</tr>
<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
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</tr>
<tr>
<td>Total Semester Credit Hours</td>
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### Second Year

#### Fall

<table>
<thead>
<tr>
<th>Course</th>
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<th>Credit Hours</th>
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<tbody>
<tr>
<td>CSCE 121</td>
<td>Introduction to Program Design and Concepts</td>
<td>4</td>
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<td>ECEN 248</td>
<td>Introduction to Digital Systems Design</td>
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</tr>
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<td>MATH 251</td>
<td>Engineering Mathematics III</td>
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<tr>
<td>Select one of the following:</td>
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<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
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</tr>
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<td>Communication for Technical Professions</td>
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<td>COMM 243</td>
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### Spring

<table>
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<th>Course</th>
<th>Description</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CSCE 221</td>
<td>Data Structures and Algorithms</td>
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<td>ECEN 214</td>
<td>Electrical Circuit Theory</td>
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<tr>
<td>MATH 308</td>
<td>Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>STAT 211</td>
<td>Principles of Statistics</td>
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### Third Year

#### Fall

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<tbody>
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<td>CSCE 313</td>
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<td>4</td>
</tr>
<tr>
<td>Total Semester Credit Hours</td>
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<td>17</td>
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</tbody>
</table>
The curriculum is designed to prepare the undergraduate for work in the highly diverse electrical engineering profession. A solid foundation in physics, chemistry and mathematics is used to support courses in the fundamentals of electrical engineering. The use of computers is integrated throughout the curriculum, and basic studies in circuits, electronics, electromagnetic fields and digital logic lead to a flexible program of electives in the junior and senior year. Electives may be chosen from the broad categories of controls/communications/signal processing, computer engineering, electronics, electro-physics/electro-optics/microwaves, power systems/power electronics, and biomedical imaging/sensing and systems. Laboratory work is structured to first familiarize the student with the basic concepts and then to apply these concepts to engineering problems.

**Program Requirements**
BMEN, CHEN and RHEN require 8 hours of freshman chemistry, which may be satisfied by CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112; Credit by Examination (CBE) for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 plus CHEM 102/CHEM 112; or 8 hours of CBE for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112.

Second Year

Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CSCE 121 Introduction to Program Design and Concepts</td>
<td>4</td>
</tr>
<tr>
<td>ECEN 248 Introduction to Digital Systems Design</td>
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</tr>
<tr>
<td>MATH 251 Engineering Mathematics III</td>
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</table>

University Core Curriculum (p. 19) | 6

| Term Semester Credit Hours | 17 |

Spring

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>ECEN 214 Electrical Circuit Theory</td>
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<td>MATH 308 Differential Equations</td>
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</tr>
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<td>MATH 311 Topics in Applied Mathematics I</td>
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</tbody>
</table>

University Core Curriculum (p. 19) | 6

| Term Semester Credit Hours | 16 |

Total Semester Credit Hours: 15

Third Year

Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ECEN 314 Signals and Systems</td>
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<td>ECEN 322 Electric and Magnetic Fields</td>
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<td>ECEN 325 Electronics</td>
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<tr>
<td>PHYS 222 Modern Physics for Engineers</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following:
- ENGL 210 Technical and Business Writing
- COMM 205 Communication for Technical Professions
- COMM 243 Argumentation and Debate

| Term Semester Credit Hours | 16 |

Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECEN 303 Random Signals and Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECEN 350/CSCE 350 Computer Architecture and Design</td>
<td>4</td>
</tr>
<tr>
<td>ECEN 370 Electronic Properties of Materials</td>
<td>3</td>
</tr>
<tr>
<td>ECEN elective (p. 725)</td>
<td>3</td>
</tr>
</tbody>
</table>

| Technical elective | 3 |

| Term Semester Credit Hours | 16 |

Total Semester Credit Hours: 18

Fourth Year

Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ECEN 403 Electrical Design Laboratory I</td>
<td>3</td>
</tr>
<tr>
<td>ECEN elective (p. 725)</td>
<td>5</td>
</tr>
</tbody>
</table>

| Technical elective | 3 |

| Term Semester Credit Hours | 12 |

Spring

<table>
<thead>
<tr>
<th>Course</th>
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</thead>
<tbody>
<tr>
<td>ECEN 404 Electrical Design Laboratory II</td>
<td>3</td>
</tr>
</tbody>
</table>

| Term Semester Credit Hours | 15 |

Total Semester Credit Hours: 95

See advising office for list of approved electives

Fulfills the University Core Curriculum requirement for Language, Philosophy and Culture.

Total Program Hours 128

Electrical Engineering - Minor

The Department of Electrical and Computer Engineering offers a minor in Electrical Engineering.

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECEN 214 Electrical Circuit Theory</td>
<td>4</td>
</tr>
<tr>
<td>ECEN 248 Introduction to Digital Systems Design</td>
<td>4</td>
</tr>
<tr>
<td>ECEN 314 Signals and Systems</td>
<td>3</td>
</tr>
<tr>
<td>ECEN 325 Electronics</td>
<td>4</td>
</tr>
<tr>
<td>ECEN Elective (p. 725)</td>
<td>3</td>
</tr>
</tbody>
</table>

| Total Semester Credit Hours | 18 |

Select course from ECEN 300-499 (p. 725) except ECEN 314, ECEN 325, ECEN 405, and ECEN 485.

Students must make a grade of "C" or better in all courses.

Further Requirements: A minimum grade point average of 2.75 is required for entering the minor. Prerequisite coursework includes the calculus sequence, MATH 308, and PHYS 208 or equivalents. Students majoring in Computer Engineering will not be permitted to minor in Electrical Engineering since the coursework prescribed for the minor is required coursework for the Computer Engineering degree.

Department of Engineering Technology and Industrial Distribution

The Department of Engineering Technology and Industrial Distribution offers baccalaureate degree programs in engineering technology and industrial distribution. These degrees are distinct from engineering and each other, but they share the features of building on a sound foundation of mathematics and basic sciences, including a strong core of technical courses, emphasizing written and oral communications and containing a significant education in the social sciences and the language, philosophy and culture. The curricula emphasize the latest state-of-the-art technologies, innovation and entrepreneurship. Established procedures for the development, production, installation, service and sales of technological products and systems are treated. Because these programs are highly applied and equipment/hardware oriented, most of the department’s courses have hands on laboratories to provide in-depth experience with equipment.
The mission of the Department of Engineering Technology and Industrial Distribution is to:

- maintain nationally recognized programs in engineering technology and industrial distribution
- focus on educating highly-qualified students with hands-on skills, providing them with experiences in advanced integration of both conventional and emerging technologies, a unique understanding of management and business practices, and an entrepreneurial point of view
- provide leadership within the COE and university in interdisciplinary applied research, to include the development and deployment of new technology
- promote and develop long term partnerships with industry and government that foster enhancements and interactions in education, research, and professional development

Department Academic Policies

The Department of Engineering Technology and Industrial Distribution (ETID) imposes the following academic requirements in addition to those imposed by the University (Texas A&M University Student Rules) and college. For complete details concerning these and other ENTC academic policies, students should contact the ETID Undergraduate Advising Office and are referred to the ETID (http://engineering.tamu.edu/etid) website.

The academic policies apply to any student who is identified as a major in an ETID program and to any student who seeks admission to an ETID program. Students are encouraged to use these academic policies, along with other important information sources, for guidance in their undergraduate programs. Official information sources include the Texas A&M University Undergraduate Catalog, the Texas A&M University Student Rules, the Texas A&M University online course schedule, Howdy (http://howdy.tamu.edu), departmental academic policies, academic advisors, program coordinators, faculty advisors, the ETID website, and University and departmental distribution lists.

Transfer students, regardless of transfer hours must meet the same standards and criteria for admission to a major degree sequence as shown above. Students currently enrolled in another major at Texas A&M University who desire to change their major field of study to a major in ETID must fill out a Change of Curriculum application. Students are encouraged to be advised at the earliest possible time and to meet the College of Engineering advising requirements. A student who registers for a course for which he/she lacks the necessary prerequisite course(s) and/or the prerequisite grade requirement will be required to drop the course. If a student is administratively dropped from a course, the student is responsible for all financial obligations associated with the drop.

A student is responsible for checking the prerequisites for each course to ensure the prerequisite requirements have been satisfied. A student who registers for a course for which he/she lacks the necessary prerequisite course(s) and/or the prerequisite grade requirement will be required to drop the course. A student who is told to drop a course and is still enrolled by the deadline set each semester may be administratively dropped by the department. If a student is administratively dropped from a course, the student is responsible for all financial obligations associated with the drop. An administrative drop may adversely impact (including, but not limited to): health insurance benefits, financial aid, athletic eligibility, INS status, veterans’ benefits, and eligibility to participate in extracurricular activities.

The department encourages students to participate in industrial internships or the Cooperative Education Program to acquire practical experience to complement their engineering technology education.

Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

Electronic Systems Engineering Technology (ESET)

Electronic Systems Engineering Technology (ESET) prepares students for careers in electronic product and system development across a diverse range of industries that include the medical, power, computer networking, automotive, telecommunications, and quality of life sectors.

The Electronic Systems Engineering Technology program is accredited by the Engineering Technology Accreditation Commission of ABET, www.abet.org (http://www.abet.org). For more information about the Electronic Systems Engineering Technology (ESET) program including the mission and program educational objectives, please see the program requirements (p. 337).

Graduates are awarded the Bachelor of Science in Electronics Systems Engineering Technology.

Manufacturing and Mechanical Engineering Technology (MMET)

The Manufacturing and Mechanical Engineering Technology program is accredited by the Engineering Technology Accreditation Commission of ABET, www.abet.org (http://www.abet.org). For more information about the Manufacturing and Mechanical Engineering Technology (MMET) program including the mission and program educational objectives, please see the program requirements (p. 338).

Graduates of this program are awarded a Bachelor of Science in Engineering Technology.

Industrial Distribution (IDIS)

Industrial distribution prepares men and women for sales engineering, sales management and mid-management positions with manufacturers who sell through distributors and with wholesale distributors who purchase, warehouse, sell, distribute and service a wide variety of industrial products. Industry segments include: automation solutions; general line; building materials; chemical and petrochemical; electrical; electronics; semiconductor; fluid power; heating, ventilation and air conditioning; mechanical power; metals; plastics; plumbing; safety equipment; specialty tools; and welding; oil & gas; defense; material handling; healthcare; automotive; heavy equipment; packaging; and logistics. The day-to-day challenges faced by the industrial distributor or the manufacturer’s representative require the person to be a professional
Majors

- Bachelor of Science in Electronic Systems Engineering Technology (p. 337)
- Bachelor of Science in Engineering Technology - Manufacturing and Mechanical Engineering Option (p. 338)
- Bachelor of Science in Industrial Distribution (p. 339)

Minors

- Embedded Systems Integration Minor (p. 341)

Masters

- Master of Industrial Distribution

Electronic Systems Engineering Technology - BS

Electronic Systems Engineering Technology (ESET) prepares students for careers in electronic product and system development across a diverse range of industries that include the medical, power, computer networking, automotive, telecommunications, and quality of life sectors. While graduates of the program receive a rigorous technical education and typically take engineering and technology positions within industry, they are also well prepared for positions in technical sales and project management. The ESET curriculum is based on a strong underpinning of engineering math and science courses followed by a core technical sequence. This core includes analog and digital electronics, embedded systems design, real-time software development using C and assembly language, wired/wireless data communications data communications, instrumentation and control. Throughout their curriculum, students work on multiple open-ended projects to design, implement, test, and evaluate hardware and software systems. One of the most unique aspects of the Electronic Systems Engineering Technology program is that almost every technical course provides a hands-on laboratory experience using facilities equipped with state-of-the-art computer systems, test equipment, and industry-standard computer-aided design and analysis packages. The technical curriculum is augmented with coursework in written and oral communications, product/system development, device/system testing and technical project management. A team-based industry-sponsored capstone design sequence provides a challenging opportunity to apply technical, managerial, and communications skills to solving a real-world problem.


ESET Program Mission

The Electronic Systems Engineering Technology Program at Texas A&M University prepares graduates for immediate impact and long-term career success by providing a real-world experiential education coupled with personalized undergraduate experiences in electronics product development, test, system integration, and engineering research.

ESET Program Educational Objectives

The Electronic Systems Engineering Technology Program at Texas A&M has as its primary educational objectives to produce graduates who, after three to five years:

- possess the technical skills to be immediately productive and have successful careers in regional, state or national electronic product and system development industries
- demonstrate increasing levels of leadership and responsibility during their careers
- exhibit a commitment to professional ethics in their professional career
- display a desire for life-long learning through continued education, technical training, and/or professional development

A continuous cycle of assessment and program improvement is used to ensure that these objectives are being met. Through interactions with industry and academic partners, the Electronic Systems Engineering Technology program continues to offer a state-of-the-art curriculum that produces successful graduates.

Program Requirements

First Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>ESET 151</td>
<td>Engineering Leadership 2</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric 1,2</td>
</tr>
<tr>
<td>CHEM 107</td>
<td>General Chemistry for Engineering</td>
</tr>
<tr>
<td>&amp; CHEM 117</td>
<td>Students Laboratory 1,2</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics 1,2,3</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Term Semester Credit Hours</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td>MATH 152</td>
<td>Engineering Mathematics II 1,2</td>
</tr>
<tr>
<td>PHYS 218</td>
<td>Mechanics 1,2</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>6</td>
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<tr>
<td></td>
<td>Term Semester Credit Hours</td>
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</table>

Second Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>ESET 210</td>
<td>Circuit Analysis 2</td>
</tr>
<tr>
<td>ESET 219</td>
<td>Digital Electronics (University Core Curriculum) 2</td>
</tr>
<tr>
<td>ESET 269</td>
<td>Embedded Systems Development in C 2</td>
</tr>
<tr>
<td>Mathematics (p. 20) 2,5</td>
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</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Term Semester Credit Hours</td>
</tr>
<tr>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td>ESET 211</td>
<td>Power Systems and Circuit Applications 2</td>
</tr>
<tr>
<td>ESET 315</td>
<td>Local-and-Metropolitan-Area Networks 2</td>
</tr>
<tr>
<td>ESET 329</td>
<td>Six Sigma and Applied Statistics 2</td>
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</tbody>
</table>
PHYS 208  Electricity and Optics 2  4

| Term Semester Credit Hours | 15 |

Third Year
Fall
ESET 333  Product Development 2  3
ESET 349  Microcontroller Architecture 2  4
ESET 350  Analog Electronics 2  4
ESET 355  Electromagnetics and High Frequency Systems 2  4
Technical Elective 2,5  3

| Term Semester Credit Hours | 18 |

Spring
ESET 352  Electronics Testing I 2  4
ESET 359  Electronic Instrumentation 2  4
ESET 369  Embedded Systems Software 2  4
ESET 415  Advanced Network Systems and Security 2  3
Communication (p. 20) 5  3

| Term Semester Credit Hours | 18 |

Fourth Year
Fall
ESET 419  Engineering Technology Capstone I 2  3
ESET 452  Electronics Testing II 2  3
ESET 455  Wireless Transmission Systems 2  4
ESET 462  Control Systems 2  4

| Term Semester Credit Hours | 14 |

Spring
ESET 420  Engineering Technology Capstone II 2  2
ENGR 482/PHIL 482  Ethics and Engineering 2  3
University Core Curriculum (p. 19) 4  6
Technical elective 2,5  3

| Term Semester Credit Hours | 14 |

Total Semester Credit Hours: 127

1 Completion of ENGL 104, MATH 151, MATH 152, CHEM 107/117, PHYS 218 with C or better required for degree sequence.
2 Course used to calculate in-major grade point ratio. Grade of C or better is required.
3 Entering students will be given a placement test in mathematics. Test results will be used in selecting the appropriate starting course which may be at a higher level or lower level.
4 Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.
5 See departmental advisor for a list of approved electives.

This curriculum lists the minimum number of classes required for graduation. Additional courses may be taken.

Engineering Technology - BS, Manufacturing and Mechanical Engineering Option

Manufacturing and mechanical engineering technology (MMET) prepares students for dynamic careers in industry. Graduates are versatile and effective in diverse areas that require understanding of the dependencies among material properties, product design, costs, manufacturing systems, and process technologies. The student views manufacturing from an enterprise and system perspective, recognizing the importance of customer and supplier interactions. To meet these diverse needs, this specialty provides a foundation of mathematics, science, and specialized technical courses, as well as preparation in oral and written communication. The three main areas of concentration are product design, manufacturing systems integration and automation, and manufacturing competitiveness. Studies in these areas are supported by a solid foundation in materials and manufacturing processes.

Program Mission

The mission of the Manufacturing and Mechanical Engineering Technology program at Texas A&M University is to provide a high-quality, application-oriented education producing professionals who can effectively contribute to leadership, the advancement of manufacturing and mechanical engineering technology, and improved performance of industrial endeavors. The educational mission is complemented by applied research and the development of new interdisciplinary technology that mutually benefits the university and its industrial, governmental, and academic collaborators. The people in the program are committed to providing service and leadership in the promotion and advancement of the University and the profession.

Program Educational Objectives

The MMET program prepares students who after a few years after graduation:

• Demonstrate manufacturing and mechanical technical knowledge, problem solving skills, and implementation skills for careers in design, installation, operations, technical sales, or service functions in industry;
• Demonstrate increasing level of leadership and responsibility;
• Exhibit both immediate and sustainable productivity in a dynamic work environment.

Program Requirements

First Year
Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 107 &amp; CHEM 117</td>
<td>General Chemistry for Engineering Students and General Chemistry for Engineering Students Laboratory 1,2</td>
</tr>
<tr>
<td>ENDG 105</td>
<td>Engineering Graphics 1</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric 1,2</td>
</tr>
</tbody>
</table>

1 Completion of ENGL 104, MATH 151, MATH 152, CHEM 107/117, PHYS 218 with C or better required for degree sequence.
2 Course used to calculate in-major grade point ratio. Grade of C or better is required.
3 Entering students will be given a placement test in mathematics. Test results will be used in selecting the appropriate starting course which may be at a higher level or lower level.
4 Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.
5 See departmental advisor for a list of approved electives.
### Engineering Mathematics I

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR 111</td>
<td>Foundations of Engineering I&lt;sup&gt;1,2&lt;/sup&gt;</td>
<td>2</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics&lt;sup&gt;1,2,3&lt;/sup&gt;</td>
<td>4</td>
</tr>
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<td></td>
<td><strong>Total Semester Credit Hours</strong></td>
<td>15</td>
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</tbody>
</table>

### Mechanical Design Applications II

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR 112</td>
<td>Foundations of Engineering II&lt;sup&gt;1,2&lt;/sup&gt;</td>
<td>2</td>
</tr>
<tr>
<td>MATH 152</td>
<td>Engineering Mathematics&lt;sup&gt;1,2&lt;/sup&gt;</td>
<td>4</td>
</tr>
<tr>
<td>MMET 181</td>
<td>Manufacturing and Assembly Processes I&lt;sup&gt;2&lt;/sup&gt;</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total Semester Credit Hours</strong></td>
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</table>

### Computer-Aided Manufacturing

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>ENGR 111</td>
<td>Foundations of Engineering I&lt;sup&gt;1,2&lt;/sup&gt;</td>
<td>2</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics&lt;sup&gt;1,2,3&lt;/sup&gt;</td>
<td>4</td>
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<tr>
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</table>

### Fourth Year Fall

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>MMET 370</td>
<td>Thermodynamics for Technologists&lt;sup&gt;2&lt;/sup&gt;</td>
<td>4</td>
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<tr>
<td></td>
<td><strong>Total Semester Credit Hours</strong></td>
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</tbody>
</table>

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### Industrial Distribution - BS

Industrial distribution prepares men and women for sales engineering, sales management and mid-management positions with manufacturers who sell through distributors and with wholesale distributors who purchase, warehouse, sell, distribute and service a wide variety of industrial products. Industry segments include: automation solutions; general line; building materials; chemical and petrochemical; electrical; electronics; semiconductor; fluid power; heating, ventilation and air conditioning; mechanical power; metals; plastics; plumbing; safety equipment; specialty tools; and welding. The day-to-day challenges faced by the industrial distributor or the manufacturer's representative require the person to be a professional with many capabilities. To fulfill this demand, the curriculum provides study in business, communications, information technology, applied technology, engineering and human relations. This
knowledge is applicable to the graduate in relationships with executives, managers, engineers, scientists and craftsmen while assisting them in their manufacturing, plant maintenance or construction operations. The industrial distribution graduate assists them by direct application of operations, business and product knowledge. Essentially the industrial distribution graduate becomes a special assistant in the other person's business—a challenging and rewarding profession. Graduates receive the Bachelor of Science degree in Industrial Distribution.

**Program Requirements**

<table>
<thead>
<tr>
<th>First Year</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td></td>
</tr>
<tr>
<td>ENDG 105</td>
<td>Engineering Graphics 1</td>
</tr>
<tr>
<td>ENGL 103 or ENGL 104</td>
<td>Introduction to Rhetoric and Composition or Composition and Rhetoric</td>
</tr>
<tr>
<td>IDIS 240</td>
<td>Introduction to Industrial Distribution 1,2</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I 2,3</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
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<tr>
<td><strong>Term Semester Credit Hours</strong></td>
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<table>
<thead>
<tr>
<th>Second Year</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td></td>
</tr>
<tr>
<td>ACCT 209</td>
<td>Survey of Accounting Principles 1</td>
</tr>
<tr>
<td>ECON 202</td>
<td>Principles of Economics 1</td>
</tr>
<tr>
<td>PHYS 208</td>
<td>Electricity and Optics</td>
</tr>
<tr>
<td>STAT 201 or STAT 303</td>
<td>Elementary Statistical Inference or Statistical Methods 1</td>
</tr>
<tr>
<td>MMET 181</td>
<td>Manufacturing and Assembly Processes I 1</td>
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<tr>
<td><strong>Term Semester Credit Hours</strong></td>
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</table>

<table>
<thead>
<tr>
<th>Spring</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>ISYS 209</td>
<td>Business Information Systems Concepts 1</td>
</tr>
<tr>
<td>MMET 206</td>
<td>Nonmetallic Materials 1</td>
</tr>
<tr>
<td>MGMT 212</td>
<td>Business Law 1</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>4</td>
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<tr>
<td><strong>Term Semester Credit Hours</strong></td>
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<table>
<thead>
<tr>
<th>Third Year</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td></td>
</tr>
<tr>
<td>IDIS 300</td>
<td>Industrial Electricity 1</td>
</tr>
<tr>
<td>MMET 207</td>
<td>Metallic Materials 1</td>
</tr>
<tr>
<td>IDIS 340</td>
<td>Manufacturer Distributor Relations 1</td>
</tr>
<tr>
<td><strong>Term Semester Credit Hours</strong></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Fourth Year</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td></td>
</tr>
<tr>
<td>IDIS 400</td>
<td>Industrial Automation 1</td>
</tr>
<tr>
<td>IDIS 424</td>
<td>Purchasing Applications in Distribution 1</td>
</tr>
<tr>
<td>IDIS 464</td>
<td>Distributor Operations and Financial Management 1</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td>3</td>
</tr>
<tr>
<td>IDIS 420</td>
<td>Contemporary Topics in Electronics Distribution: Going Green 1</td>
</tr>
<tr>
<td>IDIS 421</td>
<td>Healthcare Distribution Networks 1</td>
</tr>
<tr>
<td>IDIS 445</td>
<td>International Sales and Marketing 1</td>
</tr>
<tr>
<td>IDIS 454</td>
<td>New Directions in Distributor Competitiveness 1</td>
</tr>
<tr>
<td>IDIS 455</td>
<td>Humanitarian Distribution Networks 1</td>
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<tr>
<td>IDIS 489</td>
<td>Special Topics in... 1</td>
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<td>Directed elective 6</td>
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<tr>
<td><strong>Term Semester Credit Hours</strong></td>
<td>17</td>
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<table>
<thead>
<tr>
<th>Spring</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>IDIS 403</td>
<td>Fluid Power Transmission 1</td>
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<tr>
<td>IDIS 434</td>
<td>The Quality Process in Distribution 1,6</td>
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<tr>
<td>Directed elective 6</td>
<td>4</td>
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<tr>
<td>University Core Curriculum (p. 19)</td>
<td>4</td>
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<tr>
<td><strong>Term Semester Credit Hours</strong></td>
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</table>

| Total Semester Credit Hours: | 126 |

1. Course used to calculate in-major grade point ratio. Grade of C or better is required.
2. Completion of ENGL 104, MATH 151, MATH 152, CHEM 107/117, and PHYS 218 with a C or better in each course are required for admission to upper level.
3. Entering students will be given a placement test in mathematics. Test results will be used in selecting the appropriate starting course which may be at a higher level or lower level.
Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.

**Embedded Systems Integration - Minor**

Our cars, cell phones, even every-day appliances operate based on small, one-chip “computers” that sense the environment, make decisions, and control operation; essentially making our devices “smart.” These “computers” or embedded processors/microcontrollers are a fundamental component in most modern products and systems and are used across a wide range of industries that include medical, oil/gas, process control, automotive, communications, and quality of life.

The Embedded Systems Integration minor offered by the Department of Engineering Technology and Industrial Distribution teaches students about embedded systems hardware and software development and how these systems are used in modern products. The minor requires five courses (18 hours) and is available to not only engineering students but also students outside the Dwight Look College of Engineering who are interested in studying technology and understanding the devices that power our lives.

Students interested in an Embedded Systems Integration minor should see an advisor in Engineering Technology and Industrial Distribution for more information.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESET 219</td>
<td>Digital Electronics</td>
<td>4</td>
</tr>
<tr>
<td>ESET 269</td>
<td>Embedded Systems Development in C</td>
<td>3</td>
</tr>
<tr>
<td>ESET 333</td>
<td>Product Development</td>
<td>3</td>
</tr>
<tr>
<td>ESET 349</td>
<td>Microcontroller Architecture</td>
<td>4</td>
</tr>
<tr>
<td>ESET 369</td>
<td>Embedded Systems Software</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total Semester Credit Hours</strong></td>
<td></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

Students must make a grade of "C" or better in all courses.

**Department of Industrial and Systems Engineering**

Industrial engineering is an engineering discipline devoted to the design, installation, improvement and control of integrated systems of people, materials, and facilities in a wide range of organizations that produce goods or render services. Like other engineering fields, industrial engineering is concerned with solving problems through the application of specialized knowledge in mathematics and science, as well as the principles of engineering. An important characteristic of industrial engineering is its systems approach to integrate the basic resources of production and service systems and other relevant resources, such as information and energy, in such a way as to create a smooth, efficient and competitive operation within an enterprise. Industrial and systems engineers are needed in virtually all types of enterprises, ranging from industries such as manufacturing, distribution, logistics, transportation, and construction; service sectors such as health care, telecommunications, retail, banking, and engineering consulting to government agencies, military, and non-profit organizations.

The mission of the Industrial Engineering program is to serve the state, nation, and global community by educating industrial engineering students to be well founded in engineering fundamentals and to have the knowledge and skills required to design, develop, improve, implement and control sophisticated production and service systems in an environment characterized by complex technical and social challenges. Throughout this educational process, students will be instilled with the highest standards of professional and ethical behavior. It is the intent of the undergraduate industrial engineering program to equip its graduates to achieve the following accomplishments a few years after graduation:

1. Graduates will be successful in improving operations by solving complex industrial engineering problems.
2. Graduates will demonstrate professional leadership.
3. Graduates will be instilled with the motivation and ability to accomplish professional life-long learning.

The undergraduate program in Industrial Engineering at Texas A&M University is accredited by the Engineering Accreditation Commission of ABET, www.abet.org.

Industrial Engineering students may participate in the Undergraduate Minor Program offered by Texas A&M. This program is usually comprised of 15 to 18 hours, some of which may be substituted as technical electives. The most common minors are math, business and economics. The department also has a Fast Track Program for academically qualified students who want to take selected graduate courses and receive both graduate and undergraduate credit by meeting specific requirements. The department encourages students to participate in industrial internships or the Cooperative Education Program to acquire practical experience to complement their industrial engineering education. Internships are generally encouraged during the summer months only. Students who participate in the Co-op program during three academic semesters may count the three credit hours as a technical elective in their curriculum.

Graduate degrees including the Master of Science (MS), Master of Engineering (M.Eng.), and Doctor of Philosophy (PhD) are also offered by the department in addition to the Bachelor of Science in Industrial Engineering. For graduate degree information, please see the Texas A&M University Graduate Catalog.

Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

**Majors**

- Bachelor of Science in Industrial Engineering (p. 342)

**Minors**

- Industrial Engineering Minor (p. 343)

**Certificates**

- Data Center Operations Engineering Certificate (p. 343)
- Engineering Systems Management Certificate (p. 343)
Industrial Engineering - BS

The four-year curriculum in industrial engineering at Texas A&M is designed to provide students with a solid basis in mathematics and science, as well as in engineering economics, manufacturing systems, production and inventory control, operations research, quality engineering, reliability, facilities planning and materials handling. The program culminates with a senior design course in which students apply principles and knowledge acquired through the curriculum to an actual industrial problem.

Program Requirements

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

<table>
<thead>
<tr>
<th>First Year</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>ENGL 104 Composition and Rhetoric ¹</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 111 Foundations of Engineering I ¹</td>
<td>2</td>
</tr>
<tr>
<td>MATH 151 Engineering Mathematics I ¹,²</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 218 Mechanics ¹</td>
<td>4</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19) ³</td>
<td>3</td>
</tr>
<tr>
<td>Term Semester Credit Hours</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 107 General Chemistry for Engineering Students ¹,4</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 117 General Chemistry for Engineering Students Laboratory ¹</td>
<td>1</td>
</tr>
<tr>
<td>ENGR 112 Foundations of Engineering II ¹</td>
<td>2</td>
</tr>
<tr>
<td>MATH 152 Engineering Mathematics II ¹</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 208 Electricity and Optics ¹</td>
<td>4</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19) ³</td>
<td>3</td>
</tr>
<tr>
<td>Term Semester Credit Hours</td>
<td>17</td>
</tr>
</tbody>
</table>

| Total Semester Credit Hours | 33 |

1 A grade of C or better is required.
2 Entering students will be given a math placement exam. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.
3 Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.
4 BMEN, CHEN and RHEN require 8 hours of freshman chemistry, which may be satisfied by CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112; Credit by Examination (CBE) for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 plus CHEM 102/CHEM 112; or 8 hours of CBE for CHEM 101/CHEM 111 or CHEM 107/CHEM 117 and CHEM 102/CHEM 112.

Second Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Semester Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 251 Engineering Mathematics III</td>
<td>3</td>
</tr>
<tr>
<td>STAT 211 Principles of Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>MMET 181 Manufacturing and Assembly Processes I</td>
<td>3</td>
</tr>
<tr>
<td>CSCE 206 Structured Programming in C</td>
<td>4</td>
</tr>
<tr>
<td>ISEN 101 Introduction to Industrial Engineering</td>
<td>1</td>
</tr>
<tr>
<td>ISEN 303 Engineering Economic Analysis</td>
<td>3</td>
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<tr>
<td>Term Semester Credit Hours</td>
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</table>

<table>
<thead>
<tr>
<th>Spring</th>
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<tbody>
<tr>
<td>MATH 304 Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>STAT 212 Principles of Statistics II</td>
<td>3</td>
</tr>
<tr>
<td>MEEN 221 Statics and Particle Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>MEEN 222 Materials Science</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 210 Technical and Business Writing</td>
<td>3</td>
</tr>
<tr>
<td>ISEN 220 Introduction to Production Systems</td>
<td>3</td>
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<tr>
<td>Term Semester Credit Hours</td>
<td>18</td>
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</tbody>
</table>

Third Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISEN 420 Operations Research I</td>
<td>3</td>
</tr>
<tr>
<td>ISEN 424 Systems Simulation</td>
<td>3</td>
</tr>
<tr>
<td>MATH 308 Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>ECEN 215 Principles of Electrical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19) ³</td>
<td>6</td>
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<tr>
<td>Term Semester Credit Hours</td>
<td>18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Spring</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISEN 314 Statistical Control of Quality</td>
<td>3</td>
</tr>
<tr>
<td>ISEN 315 Production Systems Planning</td>
<td>3</td>
</tr>
<tr>
<td>ISEN 316 Production Systems Operations</td>
<td>3</td>
</tr>
<tr>
<td>MEEN 315 Principles of Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19) ³</td>
<td>3</td>
</tr>
<tr>
<td>Term Semester Credit Hours</td>
<td>15</td>
</tr>
</tbody>
</table>

Fourth Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ISEN 416  Facilities Location, Layout and Material Handling  4
Technical electives 5  6
University Core Curriculum (p. 19)  3

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spring</td>
<td>13</td>
</tr>
<tr>
<td>ISEN 459</td>
<td>Industrial Engineering Systems Design  3</td>
</tr>
<tr>
<td>ENGR 482/PHIL</td>
<td>Ethics and Engineering 482  3</td>
</tr>
<tr>
<td>Technical electives 5</td>
<td>6</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours: 93

5 A total of 12 hours of technical electives is required, of which 6 hours must be industrial engineering courses. The choice of courses to be taken must be made in consultation with the student's advisor and/or the Industrial Engineering Advising Office.

The Bachelor of Science degree in Industrial Engineering requires a grade of C or better for required industrial engineering (ISEN) courses. If a course is repeated, only the most recent grade is used in fulfilling this requirement.

Total Program Hours 126

Industrial Engineering - Minor

The Department of Industrial and Systems Engineering offers a minor in Industrial Engineering.

Program Requirements

ISEN 220  Introduction to Production Systems  3
ISEN 315  Production Systems Planning  3
ISEN 420  Operations Research I  3
Select two of the following: 6
ISEN 314  Statistical Control of Quality
ISEN 315  Production Systems Planning
ISEN 316  Production Systems Operations
ISEN 421  Operations Research II
ISEN 424  Systems Simulation

Total Semester Credit Hours 15

Students must make a grade of "C" or better in all courses.

Data Center Operations Engineering - Certificate

With the rapid acceleration of technology through innovation on a global basis, industries recognize the need for young engineers who possess base line knowledge in areas of data system management and an understanding of the system level of complex data center processing systems. In both government and industry there is a growing need for undergraduate engineering students that possess the requisite knowledge and skill sets pertaining to complex data systems management and this certificate program includes a set of courses to assure students develop this knowledge and skill set. Completion of this certificate requires completion of the following educational outcomes:

1. to know and apply principles of engineering management
2. to understand principles of systems level engineering and their application to specific data center system operations
3. to be able to go beyond understanding concepts and demonstrate appropriate usage of systems engineering principles in a design context

For additional information, contact the Data Center Operations Engineering Certificate coordinator or Engineering Academic and Student Affairs, Room 129 Zachry Engineering Center, (979) 845-7200.

Program Requirements

ISEN 440  Systems Thinking  3
Select one of the following: 4
CSCE 110  Programming I
CSCE 111  Introduction to Computer Science Concepts and Programming
CSCE 206  Structured Programming in C
Select two of the following: 6
CSCE 438  Distributed Objects Programming
CSCE 444  Structures of Interactive Information
CSCE 470  Information Storage and Retrieval
ECEN 455  Digital Communications
MEEN 421  Thermal-Fluids Analysis and Design
MEEN 436  Principles of Heating, Ventilating and Air Conditioning
MEEN 461  Heat Transfer
ISEN 314  Statistical Control of Quality
ISEN 411  Engineering Management Techniques
ISEN 414  Total Quality Engineering
ISEN 421  Operations Research II
ISEN 489  Special Topics in...

Total Semester Credit Hours 13

Engineering Systems Management - Certificate

In many areas of government and industry there is a significant need for undergraduate engineering students that possess the requisite knowledge and skill sets pertaining to engineering systems management in addition to their basic engineering discipline. With the rapid acceleration of technology through innovation on a global basis, industries recognize the need for young engineers who possess base line knowledge in areas of management and an understanding of the system level of complex engineered systems. This certificate program includes a set of courses to assure students develop this knowledge and skill set.

Program Requirements

ISEN 411  Engineering Management Techniques  3
ISEN 440  Systems Thinking  3
Select two of the following: 6
AERO 426  Space System Design
Materials science and engineering involves the characterization of the physical and chemical properties of solid materials—metals and alloys, ceramics, magnetic materials, polymers, optical materials, semiconductors, superconductors, and composites—for the purpose of using, changing, or enhancing inherent properties to create or improve end products. Materials science and engineering involves examining how the microstructure (crystalline or amorphous) of a material can be changed to influence the strength, electrical conductivity, optical, or magnetic properties of a material. This field is inherently multidisciplinary, encompassing mechanical, chemical, biomedical, civil, electrical, and aerospace engineering; physics; and chemistry.

Materials science comprises the study of materials from the macro to the atomic scale—from highway building materials to carbon nanotubes—but, independent of scale, the study of materials is concerned fundamentally with the effect of structure and chemistry on the properties of materials. Materials have historically been so important that different eras of civilization were named according to the materials from which tools were fabricated; for example, the Stone Age, the Bronze Age, and the Iron Age. The development of the semiconductor spawned the modern era of fabricated; for example, the Stone Age, the Bronze Age, and the Iron Age. The development of the semiconductor spawned the modern era of fabricated; for example, the Stone Age, the Bronze Age, and the Iron Age.

Other materials scientists are on the forefront of the revolution in biotechnology, developing materials for the components of artificial joints, heart valves, and other replacement body parts. Smart materials show a tremendous potential in medical and dental applications, such as compressible stents that reform to their intended shape upon contact with body heat once inserted into an artery, ceramic cement for bone repair, or shape-memory alloys to correct misplaced teeth or spine curvature. (Smart materials have one or more properties that can be dramatically altered, such as multiviscosity oil, with a viscosity that varies with temperature.)

Related research involves developing smaller and more reliable components, such as ferromagnetic activators acting as tiny machines in military and other applications. In aerospace engineering, materials scientists are developing airframe and fuselage materials with high strength-to-weight ratios, as well as developing smart materials into integrated sensors and actuators for reconfigurable wings and other adaptive structures.

For more information, visit the Department of Materials Science and Engineering (http://engineering.tamu.edu/materials) website.

Faculty

Arroyave, Raymundo, Associate Professor
Materials Science & Eng
PhD, Massachusetts Institute of Technology, 2004

Cagin, Tahir, Professor
Materials Science & Eng
PhD, Clemson University, 1988

Creasy, Terry S, Associate Professor
Materials Science & Eng
PhD, University of Delaware, 1997

Hartwig, Karl T, Professor
Materials Science & Eng
PhD, University of Wisconsin-Madison, 1977

Karaman, Ibrahim, Professor
Materials Science & Eng
PhD, University of Illinois at Urbana-Champaign, 2000

Liu, Li, Research Assistant Professor
Materials Science & Eng
PhD, Northwestern University, 2005

Needleman, Alan, Professor
Materials Science & Eng
PhD, Harvard University, 1971
Minors

- Materials Science and Engineering Minor (p. 345)

Materials Science and Engineering - Minor

The Department of Materials Science & Engineering minor degree program is designed to provide a strong materials science educational program for undergraduate engineering majors and to integrate a materials focus into their undergraduate training. It is intended for students who are interested in broadening their undergraduate major program of study to incorporate a fundamental understanding of materials processing and structure–property relationships to complement their major degree. Students will have the flexibility to select relevant coursework in order to customize this program of study to best suit the particular student’s intended area of focus through consultation with an MSEN faculty advisor. The minor program in materials science and engineering consists of a minimum of five three-hour courses for a total of 15 credit hours, with up to six credit hours in materials courses within their major. All students are required to have completed a prerequisite, such as MSEN 201—Engineering Materials: From Structure to Properties (or an equivalent course)—prior to applying for the minor. Two three-hour courses (six credit hours) are selected from a list of core MSEN undergraduate courses. The remaining three courses (nine credit hours) are selected from upper-level materials focused technical electives. With the permission of the MSEN faculty advisor, students may substitute up to two technical electives with courses from their major department with a primary focus on materials science and engineering. Completion of the minor will be recorded on the student’s university transcript.

For more information, visit the Department of Materials Science and Engineering (http://engineering.tamu.edu/materials) website.

Program Requirements

Select at least two of the following:

- MSEN 310 Structure of Materials
- MSEN 420 Polymer Science
- MSEN 460 Electronic, Optical and Magnetic Properties of Materials
- MSEN 489 Special Topics In... (Mechanical Behavior of Materials)
- MSEN 489 Special Topics In... (Materials Corrosion)
- MSEN 489 Special Topics In... (Processing and Performance)
- MSEN 489 Special Topics In... (Nanoscience and Nanomaterials)
- MSEN 489 Special Topics In... (Fundamentals of Ceramics)
- MSEN 685/491 Directed Studies

Total Semester Credit Hours 15

1. Upon consultation with the materials science faculty advisor, up to 2 upper-level technical electives in the student's major department may be accepted in place of these courses.
2. Or additional courses from first list.
3. Maximum of 3 credit hours may be applied toward minor.

Students must make a grade of "C" or better in all courses.

Student must achieve an overall GPA of 2.5 in approved minor courses.

Department of Mechanical Engineering

Mechanical engineering is a highly diversified profession. The mechanical engineer designs machines, devices, various products and control systems, and works with the generation, conversion, transmission, and utilization of mechanical and thermal power. Assignments often include analysis and synthesis of mechanical, thermal, and fluid systems. Mechanical engineers are also responsible for characterization, specification, and analysis of materials used in design and manufacturing. Manufacturing systems, robotics, electromechanical devices, and control systems are also the purview of the mechanical engineer. Graduates in mechanical engineering are among the most versatile engineers and enjoy professional employment in industry, government, consulting, and research organizations. The undergraduate program in Mechanical Engineering at Texas A&M University is accredited by the Engineering Accreditation Commission of ABET, www.abet.org.

The work of mechanical engineers varies from general engineering to numerous, narrow specialties, as required by the wide variety of employers. A general list, though not in any way exhaustive, of the areas of professional employment opportunities available to mechanical engineers includes: design, construction, controls, materials specification and evaluation, analysis of thermal systems, fluid and solid mechanics, manufacturing, plant engineering, research and development, and technical sales. Many mechanical engineers are promoted to management and administrative positions as well.

The mission of the Department of Mechanical Engineering is to serve the students of Texas A&M University, the State of Texas, and the nation by:

- providing quality education that is well-grounded in the fundamental principles of engineering, fostering innovation and preparing students for leadership positions and successful careers in industry, government, and academia;
• advancing the knowledge base of mechanical engineering to support the competitiveness of existing industry and to spawn new economic development in Texas and the nation through active involvement in basic and applied research; and
• providing professional development opportunities for practicing engineers through continuing education, service, and outreach activities.

Faculty

Allaire, Douglas L, Assistant Professor
Mechanical Engineering
PhD, Massachusetts Institute of Technology, 2009

Ames, Aaron D, Associate Professor
Mechanical Engineering
PhD, University of California, Berkeley, 2006

Amini, Noushin, Visiting Assistant Professor
Mechanical Engineering
PhD, Texas A&M University, 2011

Anand, Nagamangala, Professor
Mechanical Engineering
PhD, Purdue University, 1983

Annamalai, Kalyan, Professor
Mechanical Engineering
PhD, Georgia Institute of Technology, 1975

Banerjee, Debjyoti, Professor
Mechanical Engineering
PhD, University of California, Los Angeles, 1999

Beheshti, Ali, Visiting Assistant Professor
Mechanical Engineering
DEN, Louisiana State University, 2013

Caton, Jerald A, Professor
Mechanical Engineering
PhD, Massachusetts Institute of Technology, 1980

Charoenphol, Phapanin, Research Assistant Professor
Mechanical Engineering
DEN, University of Michigan, 2012

Childs, Dara W, Professor
Mechanical Engineering
PhD, University of Texas, 1968

Chowdhury, Shahla, Assistant Lecturer
Mechanical Engineering
MS, University of Illinois at Urbana-Champaign, 2013

Claridge, David E, Professor
Mechanical Engineering
PhD, Stanford University, 1976

Donnell, James M, Professor Of The Practice
Mechanical Engineering
BS, Texas A&M University, 1982

Doron, Yuval, Lecturer
Mechanical Engineering
MS, Texas A&M University, 2009

Duggleby, Andrew T, Visiting Assistant Professor
Mechanical Engineering
PhD, Virginia Tech, 2006

Felts, Jonathan R, Assistant Professor
Mechanical Engineering
DEN, University of Illinois at Urbana-Champaign, 2013

Freed, Alan D, Professor
Mechanical Engineering
DEN, University of Wisconsin-Madison, 1985

Fullerton, Tracy L, Lecturer
Mechanical Engineering
PhD, Texas A&M University, 2011

Gonezen, Sevan, Assistant Professor
Mechanical Engineering
PhD, Rensselaer Polytechnic Institute, 2011

Grunlan, Jaime C, Professor
Mechanical Engineering
PhD, University of Minnesota, 2001

Haglund, John S, Lecturer
Mechanical Engineering
PhD, Texas A&M University, 2003

Hamilton, Peter S, Associate Professor Of The Practice
Mechanical Engineering
DEN, University of Texas, Austin, 1984

Han, Je C, Distinguished Professor
Mechanical Engineering
PhD, Massachusetts Institute of Technology, 1977

Handler, Robert A, Research Professor
Mechanical Engineering
PhD, University of Minnesota, 1980

Hogan, Harry A, Professor
Mechanical Engineering
PhD, Texas A&M University, 1984

Hur, Pilwon, Assistant Professor
Mechanical Engineering
DEN, University of Illinois at Urbana-Champaign, 2010

Jacobs, Timothy J, Associate Professor
Mechanical Engineering
PhD, University of Michigan, 2005

Kim, Haejune, Research Assistant Professor
Mechanical Engineering
MS, Texas A&M University, 2007

Kim, Won-Jong, Associate Professor
Mechanical Engineering
PhD, Massachusetts Institute of Technology, 1997

Kim, Yong-Joe, Associate Professor
Mechanical Engineering
PhD, Purdue University, 2003
King, Maria D, Tees Research Associate Professor
Mechanical Engineering
PhD, Akademie Der Wissenschaften Der DDR, 1986

Kulatilaka, Waruna D, Associate Professor
Mechanical Engineering
DEN, Purdue University, 2006

Lalk, Thomas R, Associate Professor
Mechanical Engineering
PhD, University of Wisconsin-Madison, 1972

Lau, Sai C, Professor
Mechanical Engineering
PhD, University of Minnesota, 1980

Lee, Sungyon, Assistant Professor
Mechanical Engineering
PhD, Massachusetts Institute of Technology, 2010

Li, Ying, Associate Professor
Mechanical Engineering
EdD, University of Florida, 2007

Liang, Hong, Professor
Mechanical Engineering
PhD, Stevens Institute of Technology, 1992

Malak, Richard J, Associate Professor
Mechanical Engineering
PhD, Georgia Institute of Technology, 2008

McAdams, Daniel A, Professor
Mechanical Engineering
PhD, University of Texas, Austin, 1999

McGuire, Richard C, Lecturer
Mechanical Engineering
MA, Texas A&M University, 1996

McVay, Matilda W, Senior Lecturer
Mechanical Engineering
PhD, Texas A&M University, 1996

Moreno, Michael R, Assistant Professor
Mechanical Engineering
PhD, Texas A&M University, 2009

Morrison, Gerald L, Professor
Mechanical Engineering
PhD, Oklahoma State University, 1977

Mukherjee, Partha P, Assistant Professor
Mechanical Engineering
PhD, Pennsylvania State University, 2007

Muliana, Hanifah, Professor
Mechanical Engineering
PhD, Georgia Institute of Technology, 2004

Ochoa, Ozden O, Tees Research Professor
Mechanical Engineering
PhD, Texas A&M University, 1980

Ozkan, Tanil, Visiting Assistant Professor
Mechanical Engineering
DEN, University of Illinois at Urbana-Champaign, 2014

Palazzolo, Alan B, Professor
Mechanical Engineering
PhD, University of Virginia, 1981

Parlos, Alexander G, Professor
Mechanical Engineering
PhD, Massachusetts Institute of Technology, 1986

Pate, Michael B, Professor
Mechanical Engineering
PhD, Purdue University, 1982

Petersen, Eric L, Professor
Mechanical Engineering
PhD, Stanford University, 1998

Polycarpou, Andreas A, Professor
Mechanical Engineering
PhD, University at Buffalo, State University of New York, 1994

Rajagopal, Kumbakonam, Distinguished Professor
Mechanical Engineering
PhD, University of Minnesota, 1978

Rasmussen, Bryan P, Associate Professor
Mechanical Engineering
PhD, University of Illinois, 2005

Rathinam, Sivakumar, Associate Professor
Mechanical Engineering
PhD, University of California, Berkeley, 2007

Reddy, Jyothula N, Distinguished Professor
Mechanical Engineering
PhD, Texas A&M University, 1974

Sanandres, Luis A, Professor
Mechanical Engineering
PhD, Texas A&M University, 1985

Schneider, William C, Professor Of The Practice
Mechanical Engineering
PhD, Rice University, 1972

Schobeiri, Taheer M, Professor
Mechanical Engineering
PhD, Technische Universität, Germany, 1979

Srinivasar, Arun R, Professor
Mechanical Engineering
PhD, University of California, Berkeley, 1991

Staack, David A, Associate Professor
Mechanical Engineering
PhD, Drexel University, 2008

Strzelec, Andrea, Assistant Professor
Mechanical Engineering
PhD, University of Wisconsin-Madison, 2009
Suh, Chii-Der, Associate Professor
Mechanical Engineering
PhD, Texas A&M University, 1997

Tai, Li-Jung, Assistant Professor
Mechanical Engineering
PhD, University of Michigan, 2011

Wen, Sy-Bor, Associate Professor
Mechanical Engineering
PhD, University of California, Berkeley, 2006

Yu, Choongho, Associate Professor
Mechanical Engineering
PhD, University of Texas, Austin, 2004

Zhang, Xinghang, Professor
Mechanical Engineering
PhD, North Carolina State University, 2001

**Majors**

- Bachelor of Science in Mechanical Engineering (p. 348)

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**Mechanical Engineering - BS**

The objectives of the Mechanical Engineering program are to produce graduates who will:

1. Have successful careers, and become leaders, in industry and the public sector.
2. Appropriately apply acquired knowledge, work well with other people, effectively communicate.
3. Successfully pursue advanced studies, if they so choose, and subsequently contribute to the development of advanced concepts and leading edge technologies.

The educational outcomes for the Mechanical Engineering program are that students will attain:

1. An ability to function on multi-disciplinary teams.
2. An ability to identify, formulate and solve engineering problems.
3. An understanding of professional and ethical responsibility.
4. An ability to communicate effectively.
5. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
6. A recognition of the need for, and an ability to engage in life-long learning.
7. A knowledge of contemporary issues.
8. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

Mechanical engineers should possess a thorough understanding of engineering science as well as analytical and practical skills in one of many basic mechanical engineering specialties. The mechanical engineering curriculum at Texas A&M requires students to develop and apply logical thinking, innovative approaches, and ethical standards as a prerequisite for professional competence.

The curriculum consists of basic theory courses complemented by laboratory experiences in dynamic systems and controls, design, experimentation, fluid mechanics, heat transfer, manufacturing, and materials. Elective courses are offered in numerous areas including air conditioning, automotive engineering, computer-aided design, control systems, corrosion, energy conversion, internal combustion engines, manufacturing, materials, mechanical design, polymers, mechatronics, metallurgy, power generation, robotics, stress analysis, fluid mechanics, turbomachinery, and others. The selection of elective courses is dictated by the interests and goals of the student, working with departmental advisors and within the curriculum guidelines. Many students enhance their education by participating in cooperative education and/or professional internships, which offer opportunities for employment in engineering positions while working toward a degree. Numerous study abroad programs are also available for gaining experience and perspectives in the international arena. Participation in student chapters of professional and honor societies provides leadership opportunities, collegial activities, and learning experiences outside the classroom. Many students also participate in research projects through individual directed studies courses with a professor. The mechanical engineering program culminates with a senior capstone design course sequence highlighted by real-life projects sponsored by various industries. Students benefit from the challenges and gratification that come through direct interaction with practicing engineers.

Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

---

**Program Requirements**

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

---

**First Year**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Fall</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>ENGL 104 Composition and Rhetoric ¹</td>
<td>3</td>
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<td>ENGR 111 Foundations of Engineering ¹</td>
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<td>MATH 151 Engineering Mathematics ¹ ²</td>
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<td>PHYS 218 Mechanics ¹</td>
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<td>University Core Curriculum (p. 19) ³</td>
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**Spring**

<table>
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<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
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**Total**

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1. ³
2. ²
3. ⁴
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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CHEM 117</td>
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<tr>
<td>ENGR 112</td>
<td>Foundations of Engineering II</td>
<td>2</td>
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<td>MATH 152</td>
<td>Engineering Mathematics II</td>
<td>4</td>
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<tr>
<td>PHYS 208</td>
<td>Electricity and Optics</td>
<td>4</td>
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<tr>
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<td><strong>33</strong></td>
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</table>

1 A grade of C or better is required.

2 Entering students will be given a math placement exam. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.

3 Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.

4 BMEN, CHEN and RHEN require 8 hours of freshman chemistry, which may be satisfied by CHEM 101/111 or CHEM 107/117 and CHEM 102/112; Credit by Examination (CBE) for CHEM 101/111 or CHEM 107/117 plus CHEM 102/112; or 8 hours of CBE for CHEM 101/111 or CHEM 107/117 and CHEM 102/112.

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### Second Year

#### Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>MEEN 210</td>
<td>Geometric Modeling for Mechanical Design</td>
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<tr>
<td>MATH 251</td>
<td>Engineering Mathematics III</td>
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<td>MEEN 222</td>
<td>Materials Science</td>
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<td>MEEN 225</td>
<td>Engineering Mechanics</td>
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#### Spring

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>CVEN 305</td>
<td>Mechanics of Materials</td>
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</tr>
<tr>
<td>ECEN 215</td>
<td>Principles of Electrical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>MATH 308</td>
<td>Differential Equations</td>
<td>3</td>
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<tr>
<td>MEEN 315</td>
<td>Principles of Thermodynamics</td>
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<td>MEEN 260</td>
<td>Mechanical Measurements</td>
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### Third Year

#### Fall

Select one of the following:

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<th>Course Title</th>
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<td>ENGL 203</td>
<td>Writing about Literature</td>
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<td>ENGL 210</td>
<td>Technical and Business Writing</td>
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<td>COMM 205</td>
<td>Communication for Technical Professions</td>
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<td>MEEN 344</td>
<td>Fluid Mechanics</td>
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<td>MEEN 345</td>
<td>Fluid Mechanics Laboratory</td>
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<td>MEEN 357</td>
<td>Engineering Analysis for Mechanical Engineers</td>
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<tr>
<td>MEEN 360</td>
<td>Materials and Manufacturing Selection in Design</td>
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<td>MEEN 361</td>
<td>Materials and Manufacturing in Design Laboratory</td>
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</tr>
<tr>
<td>MEEN 363</td>
<td>Dynamics and Vibrations</td>
<td>3</td>
</tr>
<tr>
<td>ISEN 302</td>
<td>Economic Analysis of Engineering Projects</td>
<td>2</td>
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<td>ENGR 482/PHIL 482</td>
<td>Ethics and Engineering</td>
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<td>MEEN 401</td>
<td>Introduction to Mechanical Engineering Design</td>
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<td>MEEN 404</td>
<td>Engineering Laboratory</td>
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<td>Technical elective</td>
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<tr>
<td>STEM Course</td>
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<table>
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<tr>
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<th>Course Title</th>
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<tbody>
<tr>
<td>MEEN 421</td>
<td>Thermal-Fluids Analysis and Design</td>
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<tr>
<td>MEEN 431</td>
<td>Advanced System Dynamics and Controls</td>
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<td>MEEN 475</td>
<td>Materials in Design</td>
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#### Spring

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<th>Course Code</th>
<th>Course Title</th>
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<tr>
<td>MEEN 402</td>
<td>Intermediate Design</td>
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<tr>
<td>STEM Course</td>
<td></td>
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<th>Course Title</th>
<th>Semester Credit Hours</th>
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<tbody>
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<td>MEEN 475</td>
<td>Materials in Design</td>
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<tr>
<td>MEEN 421</td>
<td>Thermal-Fluids Analysis and Design</td>
<td>3</td>
</tr>
<tr>
<td>MEEN 431</td>
<td>Advanced System Dynamics and Controls</td>
<td>3</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
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<tr>
<td><strong>Term Semester Credit Hours</strong></td>
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<td><strong>15</strong></td>
</tr>
<tr>
<td><strong>Total Semester Credit Hours:</strong></td>
<td></td>
<td><strong>15</strong></td>
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</tbody>
</table>

5 Stem courses and technical elective: See the Mechanical Engineering Academic Advisor’s Office for a list of approved courses.

This curriculum lists the minimum number of classes required for graduation. Additional courses may be taken.

### Total Program Hours 128
Department of Nuclear Engineering

Nuclear Engineering

Nuclear engineering deals with the application and utilization of nuclear processes and radiations. The use of nuclear energy for the production of electrical power is a mature industry. Nuclear engineers work on all aspects of the nuclear fuel cycle and for many different types of employers such as government and private labs, regulatory agencies, reactor vendors, utilities and architect engineers. In addition, nuclear energy for space applications is a rapidly expanding field. Radionuclide technology in industry and medicine requires a large number of well-trained radiological health engineers. To supply qualified engineers, the Department of Nuclear Engineering offers curricula leading to the Bachelor of Science degree in Nuclear Engineering and in Radiological Health Engineering. Both degrees are accredited by the Engineering Accreditation Commission of ABET, www.abet.org.

The missions of the Department of Nuclear Engineering are:

1. to produce high quality graduates from the undergraduate through the doctoral levels to help meet the technical manpower needs of our state, region, nation and the international community;
2. to conduct research, including collaboration with research in related fields, to advance the state of knowledge in these disciplines in support of the needs of society; and
3. to perform service in these disciplines for many constituencies including our College and University, industry, government and national laboratories, professional organizations, and the public.

In fulfilling these missions, the objective of the undergraduate program is to prepare students for success in their professional endeavors following the baccalaureate degree. These endeavors may include direct employment in the private or public sectors, graduate studies in engineering or science, professional studies in medicine, business, law or public administration, service in the military, or entrepreneurial activities. To achieve this purpose, four principal educational objectives are identified. Graduates of our Bachelor of Science program in Nuclear Engineering:

1. will work on the challenges of maintenance, improvement, innovation, education, and research in nuclear power and industrial utilization of nuclear radiation and radionuclides. In this work, they will fulfill independent assignments, engage in collaborations, and manage the work of others with effective communications characterizing all phases of their responsibilities;
2. will conduct their professional activities with full recognition of the choices and challenges implicit to their work, to its ethical dimensions, and to their implications for matters beyond their immediate tasks;
3. will take the local, global, historical, social, economic, and political settings into account in both their domestic and international endeavors; and
4. will recognize and utilize both the accumulated body of results from prior work and the continuing evolution of science and technology as essential resources for the effective conduct of their work.

The nuclear engineering baccalaureate degree programs stress engineering science fundamentals and mathematics. However, considerable numbers of elective hours are available in the curriculum to permit students to broaden their educations as desired.

Most of the facilities used in the MS and PhD programs are also used in the undergraduate degree programs. These facilities make the Department of Nuclear Engineering one of the best equipped in the United States. Texas A&M is now the only University in the United States with two nuclear reactors on its campus.

Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

Radiological Health Engineering

The large number of operating nuclear power plants has created a strong demand for specialists in radiological health engineering. Well-educated individuals are, and will be, required in all aspects of the nuclear power industry from mining all the way to disposal of wastes from spent fuel. There are needs for radiological health specialists in government, hospitals, educational institutions and in private industry. This program at Texas A&M is designed to give students a broad background so they will be able to assume positions in any area of the nuclear industry. The Texas A&M Radiological Health Engineering degree is the only one in the United States that is accredited by the Engineering Accreditation Commission of ABET, www.abet.org.

The missions of the Nuclear Engineering Department are:

1. to produce high quality graduates from the undergraduate through the doctoral levels to help meet the technical manpower needs of our state, region, nation and the international community;
2. to conduct research, including collaboration with research in related fields, to advance the state of knowledge in these disciplines in support of the needs of society; and
3. to perform service in these disciplines for many constituencies including our College and University, industry, government and national laboratories, professional organizations, and the public.

In fulfilling these missions, the objective of the undergraduate program is to prepare students for success in their professional endeavors following the baccalaureate degree. These endeavors may include direct employment in the private or public sectors, graduate studies in engineering or science, professional studies in medicine, business, law or public administration, service in the military, or entrepreneurial activities. To achieve this purpose, four principal educational objectives are identified. Graduates of our Bachelor of Science program in Radiological Health Engineering:

1. will work on the challenges of maintenance, improvement, innovation, education, and research in the safe and environmentally responsible utilization of nuclear resources including, but not limited to, their occurrence in power production, industrial, and medical applications. In this work, they will fulfill independent assignments, engage in collaborations, and manage the work of others with effective communications characterizing all phases of their responsibilities.
2. will conduct their professional activities with full recognition of the choices and challenges implicit to their work, to its ethical dimensions, and to their implications for matters beyond their immediate tasks.
3. will take the local, global, historical, social, economic and political settings into account in both their domestic and international endeavors.
4. will recognize and utilize both the accumulated body of results from prior work and the continuing evolution of science and technology as essential resources for the effective conduct of their work.

The radiological engineering baccalaureate degree programs stress engineering science fundamentals and mathematics. However, considerable numbers of elective hours are available in the curriculum to permit students to broaden their educations as desired.

The radiological health engineering program is administered by the Department of Nuclear Engineering and has the same objectives and facilities that are stated under the curriculum in Nuclear Engineering. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

Faculty
Adams, Marvin L, Professor
Nuclear Engineering
PhD, University of Michigan, 1986

Akabani, Gamal, Associate Professor
Nuclear Engineering
PhD, Texas A&M University, 1990

Boyle, David R, Visiting Associate Professor
Nuclear Engineering
PhD, Massachusetts Institute of Technology, 1980

Braby, Leslie A, Tees Research Professor
Nuclear Engineering
PhD, Oregon State University, 1972

Charlton, William S, Professor
Nuclear Engineering
PhD, Texas A&M University, 1999

Chirayath, Sunil S, Visiting Assistant Professor
Nuclear Engineering
PhD, University of Madras, 2005

Ford, John R, Associate Professor
Nuclear Engineering
PhD, University of Tennessee, 1992

Guetersloh, Stephen B, Assistant Professor
Nuclear Engineering
PhD, Colorado State University, 2003

Hassan, Yassin A, Professor
Nuclear Engineering
PhD, University of Illinois, 1980

Kee, Ernie J L, Associate Professor Of The Practice
Nuclear Engineering
BS, University of Idaho, 1978

Kuwritz, Richard C, Tees Associate Research Engineer
Nuclear Engineering
PhD, Texas A&M University, 2009

Marianno, Craig M, Tees Senior Research Engineer
Nuclear Engineering
PhD, Oregon State University, 2000

McClaren, Ryan G, Assistant Professor
Nuclear Engineering
PhD, University of Michigan, 2007

McDeavitt, Sean M, Associate Professor
Nuclear Engineering
PhD, Purdue University, 1992

Morel, Jim E, Professor
Nuclear Engineering
PhD, University of New Mexico, 1979

Nelson, Paul, Tees Research Engineer
Nuclear Engineering
PhD, University of New Mexico, 1969

Ostrovskaya, Natela G, Senior Lecturer
Nuclear Engineering
PhD, Texas A&M University, 2005

Peddicord, Kenneth L, Professor
Nuclear Engineering
PhD, University of Illinois, 1972

Poston, John W, Professor
Nuclear Engineering
PhD, Georgia Institute of Technology, 1971

Ragusa, Jean C, Associate Professor
Nuclear Engineering
PhD, Institut National Polytechnique de Grenoble, 2002

Rheece, Warren D, Professor
Nuclear Engineering
PhD, Georgia Institute of Technology, 1988

Shao, Lin, Associate Professor
Nuclear Engineering
PhD, University of Houston, 2001

Tsverkov, Pavel V, Associate Professor
Nuclear Engineering
PhD, Texas A&M University, 2002

Vierow, Karen M, Associate Professor
Nuclear Engineering
PhD, The University of Tokyo, 1999

Majors
- Bachelor of Science in Nuclear Engineering (p. 351)
- Bachelor of Science in Radiological Health Engineering (p. 353)

Minors
- Nuclear Engineering Minor (p. 354)
- Radiological Health Engineering Minor (p. 354)

Nuclear Engineering - BS
The Department of Nuclear Engineering offers a BS in Nuclear Engineering.

Program Requirements
The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

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<td>ENGL 104</td>
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<td>ENGR 111</td>
<td>Foundations of Engineering I</td>
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</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
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</tr>
<tr>
<td>PHYS 218</td>
<td>Mechanics</td>
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<tr>
<td>University Core Curriculum (p. 19)</td>
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**Term Semester Credit Hours:** 16

**Spring**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 107</td>
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</table>

**Term Semester Credit Hours:** 16

**Total Semester Credit Hours:** 33

1. A grade of C or better is required.
2. Entering students will be given a math placement exam. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.
3. Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.

Second Year
Fall

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>MATH 251</td>
<td>Engineering Mathematics III</td>
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</tr>
<tr>
<td>MEEN 221</td>
<td>Statics and Particle Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>NUEN 101</td>
<td>Principles of Nuclear Engineering</td>
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<td>NUEN 265</td>
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**Term Semester Credit Hours:** 16

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</tr>
<tr>
<td>MEEN 315</td>
<td>Principles of Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>NUEN 302</td>
<td>Introduction to Nuclear Engineering II</td>
<td>3</td>
</tr>
</tbody>
</table>

**Term Semester Credit Hours:** 15

Third Year
Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 203 or ENGL 210</td>
<td>Public Speaking or Technical and Business Writing</td>
<td>3</td>
</tr>
<tr>
<td>MATH 309</td>
<td>Linear Algebra for Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>MEEN 344</td>
<td>Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>NUEN 301</td>
<td>Nuclear Reactor Theory</td>
<td>3</td>
</tr>
<tr>
<td>NUEN 309/SENG 309</td>
<td>Radiological Safety</td>
<td>3</td>
</tr>
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</table>

**Term Semester Credit Hours:** 15

**Spring**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISEN 302</td>
<td>Economic Analysis of Engineering Projects</td>
<td>2</td>
</tr>
<tr>
<td>MEEN 461</td>
<td>Heat Transfer</td>
<td>3</td>
</tr>
<tr>
<td>NUEN 303</td>
<td>Nuclear Detection and Isotope Technology Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>NUEN 304</td>
<td>Nuclear Reactor Analysis</td>
<td>3</td>
</tr>
<tr>
<td>NUEN 329</td>
<td>Analytical and Numerical Methods</td>
<td>3</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td></td>
<td>3</td>
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</tbody>
</table>

**Term Semester Credit Hours:** 15

Fourth Year
Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUEN 405</td>
<td>Nuclear Engineering Experiments</td>
<td>3</td>
</tr>
<tr>
<td>NUEN 406</td>
<td>Nuclear Engineering Systems and Design</td>
<td>3</td>
</tr>
<tr>
<td>NUEN 430</td>
<td>Computer Applications in Nuclear Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Technical elective</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

**Term Semester Credit Hours:** 17

4. BMEN, CHEN and RHEN require 8 hours of freshman chemistry, which may be satisfied by CHEM 101/CHEN 111 or CHEM 107/CHEN 117 and CHEM 102/CHEN 112; Credit by Examination (CBE) for CHEM 101/CHEN 111 or CHEM 107/CHEN 117 plus CHEM 102/CHEN 112; or 8 hours of CBE for CHEM 101/CHEN 111 or CHEM 107/CHEN 117 and CHEM 102/CHEN 112.
### Term Semester Credit Hours: 15

**Spring**
- ENGR 482/PHIL 482 Ethics and Engineering 3
- NUEN 410 The Design of Nuclear Reactors 4
- NUEN 481 Seminar 1
- NUEN Technical elective (p. 902) 6
- Technical elective 6
- University Core Curriculum (p. 19) 3

**Total Semester Credit Hours:** 17

### Term Semester Credit Hours: 17

**Spring**
- MAT 308 Differential Equations 3
- MEEN 315 Principles of Thermodynamics 3
- NUEN 302 Introduction to Nuclear Engineering II 3
- STAT 211 Principles of Statistics I 3
- VTPP 435 Physiology for Bioengineers II 4

**Total Semester Credit Hours:** 16

### Total Program Hours 128

### Radiological Health Engineering - BS

The Department of Nuclear Engineering offers a BS in Radiological Health Engineering.

### Program Requirements

#### First Year

**Fall**
- **Semester Credit Hours:** 17

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 111</td>
<td>Fundamentals of Chemistry Laboratory I 1</td>
<td></td>
</tr>
<tr>
<td>ENGR 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>ENGR 111</td>
<td>Foundations of Engineering I</td>
<td>2</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I 2</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 218</td>
<td>Mechanics</td>
<td>4</td>
</tr>
</tbody>
</table>

**Term Semester Credit Hours:** 17

**Spring**
- CHEM 102 | Fundamentals of Chemistry II and Fundamentals of Chemistry Laboratory II | 4 |
| & CHEM 112 | Fundamentals of Chemistry Laboratory II 1 |  |
| ENGR 112 | Foundations of Engineering II | 2 |
| MATH 152 | Engineering Mathematics II | 4 |
| PHYS 208 | Electricity and Optics | 4 |
| University Core Curriculum (p. 19) 3 | 3 |

**Term Semester Credit Hours:** 17

#### Second Year

**Fall**
- **Semester Credit Hours:** 15

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 251</td>
<td>Engineering Mathematics III</td>
<td>3</td>
</tr>
<tr>
<td>MEEN 221</td>
<td>Statics and Particle Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>NUEN 101</td>
<td>Principles of Nuclear Engineering</td>
<td>1</td>
</tr>
<tr>
<td>NUEN 201</td>
<td>Introduction to Nuclear Engineering I</td>
<td>3</td>
</tr>
<tr>
<td>VTPP 434</td>
<td>Physiology for Bioengineers I</td>
<td>4</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19) 3</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Spring**
- CVEN 305 Mechanics of Materials | 3 |
| ENGR 482/PHIL 482 Ethics and Engineering 2 | 3 |
| NUEN 479 | Radiation Protection Engineering | 3 |
| NUEN 481 | Seminar | 1 |
| University Core Curriculum (p. 19) 3 | 6 |

**Term Semester Credit Hours:** 16

**Total Semester Credit Hours:** 132

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1. Credit by examination for these courses also satisfies this requirement.

5. Power Option alternative. Students who intend to work in the nuclear power industry immediately upon completion of the BS degrees have the option of substituting NUEN 460. If this choice is made, then the student must also select NUEN 418 as a technical elective.

6. As approved by departmental advisor.
2 Entering students will be given a placement test in mathematics. Test results will be used to select the appropriate starting course.

3 Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.

4 As approved by the departmental advisor.

**Nuclear Engineering - Minor**

The Department of Nuclear Engineering offers a minor in Nuclear Engineering.

**Program Requirements**

- NUEN 301 Nuclear Reactor Theory 3
- NUEN 302 Introduction to Nuclear Engineering II 3
- NUEN 303 Nuclear Detection and Isotope Technology Laboratory 3
- NUEN 304 Nuclear Reactor Analysis 3
- NUEN 405 Nuclear Engineering Experiments 3

**Total Semester Credit Hours** 15

Students must make a grade of "C" or better in all courses.

**Radiological Health Engineering - Minor**

The Department of Radiological Health Engineering offers a minor in Radiological Health Engineering.

**Program Requirements**

- NUEN 301 Nuclear Reactor Theory 3
- NUEN 302 Introduction to Nuclear Engineering II 3
- NUEN 303 Nuclear Detection and Isotope Technology Laboratory 3
- NUEN 309/ SENG 309 Radiological Safety 3
- Select one of the following: 3
  - NUEN 475 Environmental Nuclear Engineering
  - NUEN 479 Radiation Protection Engineering

**Total Semester Credit Hours** 15

Students must make a grade of "C" or better in all courses.

**Harold Vance Department of Petroleum Engineering**

Petroleum Engineering is concerned primarily with the economic extraction of oil, gas, and other natural resources from the earth. Oil and gas is produced through the design, drilling and operation of wells and well systems, and the integrated management of the underground reservoirs in which the resources are found.

The mission of the Petroleum Engineering Department is to create, preserve, integrate, transfer and apply petroleum engineering knowledge and to enhance the human capability of its practitioners. The Petroleum Engineering Program has two educational objectives:

- graduates will have the technical depth and breadth to be successful professionals early in their careers; and
- graduates will have the broad technical knowledge and soft skills needed to rise to positions of professional leadership.

In essence, the goal of the Petroleum Engineering curriculum is to provide a modern engineering education with proper balance between fundamentals and practice, and to graduate engineers capable of being productive contributors immediately who are also prepared for life-long learning. The curriculum includes study of:

- design and analysis of well systems and procedures for drilling and completing wells;
- characterization and evaluation of subsurface geological formations and their resources;
- design and analysis of systems for producing, injecting and handling fluids;
- application of reservoir engineering principles and practices for optimizing resource development and management; and
- use of project economics and resource valuation methods for design and decision making under conditions of risk and uncertainty.

There is a heavy emphasis on mathematics, computer applications, communication skills and interdisciplinary problem solving. As a result, Aggie petroleum engineers are in high demand in the industry, and their starting salaries are consistently among the top in the University and the nation.

The department is well known for its curriculum, facilities and faculty, and its undergraduate program was recognized as the best in the nation by U.S. News and World Report in their most recent evaluation. The faculty comprises more than 40 professors and lecturers, many of them widely known and globally involved in the petroleum industry. Three (3) of the faculty are members of the prestigious National Academy of Engineering, and 17 are Distinguished Members of the Society of Petroleum Engineers. The Bachelor of Science program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org.

Students must work as interns during the summer months; a minimum of six weeks of approved experience is required for graduation. The department also participates in the Cooperative Education Program.

In addition to the Bachelor of Science degree in Petroleum Engineering, the department also offers both masters and doctoral degrees, including the Master of Science and Master of Engineering, and the Doctor of Philosophy and Doctor of Engineering (see the Texas A&M University Graduate and Professional Catalog).

Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

**Faculty**

Abedi Mashhadimighani, Sara, Assistant Professor
Petroleum Engineering
PhD, University of Southern California, 2012
Akkutlu, Ibrahim Y, Associate Professor
Petroleum Engineering
PhD, University of Southern California, 2002

Ayers, Walter B, Visiting Professor
Petroleum Engineering
PhD, University of Texas, 1984

Barrufet, Maria A, Professor
Petroleum Engineering
PhD, Texas A&M University, 1987

Bastian, Peter A, Professor Of The Practice
Petroleum Engineering
MS, Texas A&M University, 1983

Blasingame, Thomas A, Professor
Petroleum Engineering
PhD, Texas A&M University, 1989

Dattagupta, Akhil, Professor
Petroleum Engineering
PhD, University of Texas, 1992

Dupriest, Fred E, Professor Of The Practice
Petroleum Engineering
BS, Texas A&M University, 1977

Gildin, Eduardo, Associate Professor
Petroleum Engineering
PhD, University of Texas, 2006

Hasan, Abu Rashid, Professor
Petroleum Engineering
PhD, University of Waterloo, 1979

Hascakir, Berna, Assistant Professor
Petroleum Engineering
PhD, Middle East Technical University, 2008

Heidari, Zoya, Assistant Professor
Petroleum Engineering
PhD, University of Texas, Austin, 2011

Hill, Alfred D, Professor
Petroleum Engineering
PhD, University of Texas, 1978

Jochen, John E, Senior Lecturer
Petroleum Engineering
MS, Texas A&M University, 1993

Killough, John E, Professor
Petroleum Engineering
PhD, Rice University, 1986

Kim, Jihoon, Assistant Professor
Petroleum Engineering
PhD, Stanford University, 2010

King, Michael J, Professor
Petroleum Engineering
PhD, Syracuse University, 1980

Liang, Jenn T, Professor
Petroleum Engineering
PhD, University of Texas, Austin, 1988

Maggard, Bryan, Senior Lecturer
Petroleum Engineering
PhD, Texas A&M University, 2000

McCain, William D, Visiting Professor
Petroleum Engineering
PhD, Georgia Institute of Technology, 1964

McLeroy, Priscilla G, Professor Of The Practice
Petroleum Engineering
MEN, Stanford University, 1986

McVay, Duane A, Professor
Petroleum Engineering
PhD, Texas A&M University, 1994

Moridis, George J, Visiting Professor
Petroleum Engineering
PhD, Texas A&M University, 1987

Morita, Nobuo, Professor
Petroleum Engineering
PhD, University of Texas, Austin, 1974

Nascentes Alves, Ibere, Professor Of The Practice
Petroleum Engineering
PhD, University of Tulsa, 1991

Nasr-El-Din, Hisham A, Professor
Petroleum Engineering
PhD, University of Saskatchewan, 1984

Nasrabadi, Hadi, Assistant Professor
Petroleum Engineering
PhD, Imperial College, London, 2006

Noynaert, Samuel F, Assistant Professor
Petroleum Engineering
PhD, Texas A&M University, 2013

Reed, Teri K, Associate Professor
Petroleum Engineering
PhD, Arizona State University, 1999

Rodrigues De Paula Lima, Heitor, Professor Of The Practice
Petroleum Engineering
PhD, Texas A&M University, 1998

Schechter, David S, Associate Professor
Petroleum Engineering
PhD, Bristol University, United Kingdom, 1989

Schubert, Jerome J, Associate Professor
Petroleum Engineering
PhD, Texas A&M University, 1999

Silva, Catherine A, Senior Lecturer
Petroleum Engineering
BS, Texas A&M University, 1980
Sliva, Glenn M, Senior Lecturer
Petroleum Engineering
BS, Texas A&M University, 1981

Smith, Terri S, Lecturer
Petroleum Engineering
MA, California State University, 1993

Valko, Peter P, Professor
Petroleum Engineering
PhD, Institute of Catalysis, 1981

Voneiff, George W, Professor Of The Practice
Petroleum Engineering
MS, Texas A&M University, 1992

Weijermars, Rudy, Professor
Petroleum Engineering
PhD, University of Uppsala, Sweden, 1987

Wu, Kan, Assistant Professor
Petroleum Engineering
PhD, University of Texas, Austin, 2014

Zhu, Ding, Professor
Petroleum Engineering
PhD, University of Texas, 1992

**Majors**

- Bachelor of Science in Petroleum Engineering (p. 356)

**Minors**

- Petroleum Engineering Minor (p. 357)

**Certificates**

- Energy Engineering Certificate (p. 357)

**Petroleum Engineering - BS**

The Department of Petroleum Engineering offers a BS in Petroleum Engineering.

**Program Requirements**

The freshman year is identical for degrees in aerospace engineering, biomedical engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering, ocean engineering, and petroleum engineering thus allowing a student with adequate grades to change majors within the Dwight Look College of Engineering. The freshman year is slightly different for chemical engineering and radiological health engineering in that students take CHEM 101/111 and CHEM 102/112 instead of CHEM 107/117. Students pursuing degrees in biological and agricultural engineering, computer science, engineering technology, or industrial distribution should refer to the specific curriculum for these majors. It is recognized that many students will change the sequence and number of courses taken in any semester. Deviations from the prescribed course sequence, however, should be made with care to ensure that prerequisites for all courses are met. In addition to the freshman year curriculum listed below, students should refer to the specific curriculum for each major for other requirements. Before commencing course work in the major, students must be admitted to the major or have the approval of the department.

### First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
</tr>
<tr>
<td>ENGR 111</td>
<td>Foundations of Engineering I</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
</tr>
<tr>
<td>PHYS 218</td>
<td>Mechanics</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
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<tr>
<td><strong>Term Semester Credit Hours</strong></td>
<td><strong>16</strong></td>
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<tr>
<th>Spring</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CHEM 107</td>
<td>General Chemistry for Engineering Students</td>
</tr>
<tr>
<td>CHEM 117</td>
<td>General Chemistry for Engineering Students Laboratory</td>
</tr>
<tr>
<td>ENGR 112</td>
<td>Foundations of Engineering II</td>
</tr>
<tr>
<td>MATH 152</td>
<td>Engineering Mathematics II</td>
</tr>
<tr>
<td>PHYS 208</td>
<td>Electricity and Optics</td>
</tr>
<tr>
<td>University Core Curriculum (p. 19)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Term Semester Credit Hours</strong></td>
<td><strong>17</strong></td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours: 33**

1. A grade of C or better is required.
2. Entering students will be given a math placement exam. Test results will be used in selecting the appropriate starting course which may be at a higher or lower level.
3. Of the 18 hours shown as University Core Curriculum electives, 3 must be from creative arts, 3 from social and behavioral sciences, 6 from American history, and 6 from government/political science. The required 6 hours from international and cultural diversity may be met by courses satisfying the creative arts, social and behavioral sciences, and American history requirements if they are also on the approved list of international and cultural diversity courses.
4. BMEN, CHEN and RHEN require 8 hours of freshman chemistry, which may be satisfied by CHEM 101/111 or CHEM 107/117 and CHEM 102/112; Credit by Examination (CBE) for CHEM 101/111 or CHEM 107/117 plus CHEM 102/112; or 8 hours of CBE for CHEM 101/111 or CHEM 107/117 and CHEM 102/112.

### Second Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>COMM 205</td>
<td>Communication for Technical Professions</td>
</tr>
<tr>
<td>GEOL 104</td>
<td>Physical Geology</td>
</tr>
<tr>
<td>MATH 251</td>
<td>Engineering Mathematics III</td>
</tr>
<tr>
<td>MEEN 221</td>
<td>Statics and Particle Dynamics</td>
</tr>
<tr>
<td>PETE 225</td>
<td>Introduction to Drilling Systems</td>
</tr>
<tr>
<td><strong>Term Semester Credit Hours</strong></td>
<td><strong>16</strong></td>
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</table>

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<tr>
<th>Spring</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CVEN 305</td>
<td>Mechanics of Materials</td>
</tr>
<tr>
<td>MATH 308</td>
<td>Differential Equations</td>
</tr>
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</table>
MEEN 315  Principles of Thermodynamics 3
PETE 311  Reservoir Petrophysics 4
University Core Curriculum (p. 19) 3

Term Semester Credit Hours 16

Third Year
Fall
GEOL 404  Geology of Petroleum 3
PETE 301  Petroleum Engineering Numerical Methods 3
PETE 310  Reservoir Fluids 4
PETE 314  Transport Processes in Petroleum Production 3
PETE 335  Technical Presentations I 1
PETE 353  Petroleum Project Evaluation 3

Term Semester Credit Hours 17

Spring
PETE 321  Formation Evaluation 4
PETE 323  Fundamentals of Reservoir Engineering 3
PETE 324  Well Testing 3
PETE 325  Petroleum Production Systems 3
PETE 355  Drilling Engineering 3

Summer
PETE 300  Summer Practice 0

Term Semester Credit Hours 16

Fourth Year
Fall
PETE 401  Reservoir Simulation 2
PETE 404  Integrated Reservoir Modeling 3
PETE 410  Production Engineering 3
PETE 435  Technical Presentations II 1
University Core Curriculum (p. 19) 3

Term Semester Credit Hours 15

Spring
ENGR 482/PHIL 482  Ethics and Engineering 3
PETE 402  Integrated Asset Development 3
Technical elective 6 6
University Core Curriculum (p. 19) 3

Term Semester Credit Hours 15

Total Semester Credit Hours: 95

5 Independent study of a petroleum engineering problem, the solution of which will be documented by an oral presentation at the departmental student paper contest held during the same academic year.

6 As approved by the department head, see the Department of Petroleum Engineering website for a list of approved courses.

Total Program Hours 128

Petroleum Engineering - Minor

The Department of Petroleum Engineering offers a minor in Petroleum Engineering.

Program Requirements
GEOL 104  Physical Geology 4
PETE 225  Introduction to Drilling Systems 3
PETE 310  Reservoir Fluids 4
PETE 311  Reservoir Petrophysics 4
PETE 325  Petroleum Production Systems 3

Total Semester Credit Hours 18

Students must make a grade of "C" or better in all courses.

Energy Engineering - Certificate

The objective of the Energy Engineering Certificate program is to better prepare undergraduate students to face the challenges of world energy supply and demand and how to ensure a sustainable energy future. The program will educate engineering majors and suitably prepared science majors about all energy sources, their development, generation, conversion, transmission, and use; with an emphasis on the importance of improving the standard of living for all people while at the same time preserving and improving the environment. To earn the Energy Engineering Certificate, a student must complete a minimum of 12 semester credit hours which includes one required course and three additional courses to be selected from a specified list. Completion of the certificate will be recorded on the student’s University transcript.

For additional information, contact the Energy Engineering Certificate coordinator or Engineering Academic and Student Affairs, Room 129 Zachry Engineering Center, (979) 845-7200.

Program Requirements
ENGR 101  Energy: Resources, Utilization and Importance to Society 4
Select three of the following: 9
ARCH 421  Energy and Sustainable Architecture
CHEN 455/ SENG 455  Process Safety Engineering
MEEN 410  Internal Combustion Engines
MEEN 436  Principles of Heating, Ventilating and Air Conditioning
MEEN 437  Principles of Building Energy Analysis
NUEN 489  Special Topics in...
College of Geosciences

Administrative Officers

Dean - Kate C. Miller, Ph.D.

Executive Associate Dean and Associate Dean for Research - Jack G. Baldauf, Ph.D.

General Statement

Planet Earth is our home. Humans live on land which occupies only 29 percent of Earth’s surface. The remainder is covered by ocean. An envelope of air surrounds Earth. These realms—the lithosphere, hydrosphere, and atmosphere—form the environment for life on this planet. The study of these realms and their interactions with the biosphere and human systems, comprises the Geosciences—Atmospheric Sciences, Geography, Geology and Geophysics, and Oceanography.

The College of Geosciences is home to four academic departments in these disciplines and interdisciplinary academic offerings in Environmental Programs and Water Management and Hydrological Sciences. The mission of the College of Geosciences is to advance new understandings of the Earth system and apply them to the needs of society, to prepare the next generation of geoscientists to conduct research, to find and develop natural resources, and to measure and respond to environmental change. In doing this, the College of Geosciences intends to lead in establishing the geosciences as the most important and impactful scientific discipline of the 21st century. To sustain human society into the future will depend more on the innovation and application of discovery in the geosciences than in other disciplines. The interdisciplinarity of our field is essential to solving today’s grand challenges—understanding global climate change, maintaining air and water quality, and producing adequate energy and food supplies for all people.

Geography studies humans and their interactions with the environment from a spatial perspective using a range of methods and geospatial technologies. As an interdisciplinary field, it synthesizes knowledge from the other geosciences as well as from the social and biological sciences. Geology deals with the processes and forces acting at the surface and within Earth: with the materials of Earth, its forms and structures, and with the history of its development and the evolution of life on its surface and in its waters. Geophysics focuses on the physics of solid Earth. This includes the measurement and understanding of its internal structure, physical properties, and plate motions and their effect on continents and ocean basins. It also includes the detection of natural resources through remote sensing. Atmospheric Sciences includes studies of weather/meteorology, climate and climate change, and air quality through the disciplines of atmospheric dynamics, atmospheric physics, and atmospheric chemistry. Oceanography is the study of the marine environment and its inhabitants. The distribution and nature of marine life, the development of ocean basins, the chemistry of ocean waters, and the dynamics of water masses are the major elements of Oceanography.

Degrees in Oceanography are available only at the graduate level. Atmospheric Sciences, Geography, and Geology & Geophysics offer BS, MS, and PhD degrees; a BA is also available in Geology. The College offers two interdisciplinary BS degrees through Environmental Programs: a BS in Environmental Studies and a BS in Environmental Geosciences. In addition, Geography offers a BS in Geographic Information Science and Technology and a BS in University Studies with a concentration in Geography. The College hosts a graduate program leading to an MS and PhD in Water Management and Hydrological Sciences. A non-thesis Master of Geosciences degree is also offered.

College of Geosciences faculty members participate in research on a broad front of both basic and applied subjects. The College is the Science Operator for the International Ocean Discovery Program (http://iodp.tamu.edu), which is the largest geosciences research program in the world and explores the structure and history of sediments and crust beneath the sea floor. Other coordinated research programs in the College include the Geochemical and Environmental Research Group, the Center for Tectonophysics, Texas Sea Grant, the Berg-Hughes Center for Petroleum and Sedimentary Systems, the Center for Atmospheric Chemistry and the Environment and the Texas Center for Climate Studies. Field work takes both faculty and students around the world to learn about the wide range of environments and processes affecting Earth and its inhabitants. Consequently, faculty bring to their classes the excitement of discovery, state-of-the-art scientific equipment, a knowledge of useful applications to human problems, and good working relations with industry and governments, all of which can help the undergraduate prepare for a rewarding career.

Career opportunities for graduates in the Geosciences are evolving dynamically—in industry, business, education and government at all levels. Geosciences professionals conduct research essential to understanding an increasingly unpredictable Earth; search for sustainable energy, mineral, and water resources; work to predict and mitigate natural hazards; contribute to wise environmental policy development and decision-making; and teach in high schools, colleges, and universities.

Double Major

Students in the College of Geosciences may elect to have two major fields of study within the College, or they may elect to have a major in the College of Geosciences in conjunction with a major in another college provided that both majors lead to the same baccalaureate degree; that is, both must lead to a BA or to a BS. Approval is required by the Associate Dean for Academic Affairs in the College of Geosciences, the current major department, and the proposed major department. Additional permissions may be required if a student elects a double major in two different colleges. Students seeking to double major must have a 3.0 overall GPA and a 3.0 in the current major at the time of application. Students pursuing a double major must:

1. satisfy all University and College requirements;
2. successfully complete departmental requirements in each major, if both majors are in the College of Geosciences; and
3. in cases where one major is in the College of Geosciences and the other is in another college, the student must successfully meet the major field of study requirements for each area as determined by each college.

Minors

Students may choose to complete a minor in the College of Geosciences. All minors will require not less than 15 hours and not more than 18 hours in the discipline; at least 6 hours must be upper-division courses in the discipline. Each student choosing to complete a minor must contact the department offering the minor to determine if specific courses are required.
Change of Major and Transfer Students

Change of Major students are welcomed in the College of Geosciences. Students seeking entry from another major must be in good academic standing, meet approval of the Associate Dean and have shown interest in their new intended major by taking at least one course in the subject. To begin the Change of Major process, students should first contact the academic advisor in the department to which they wish to change. If the student meets minimum criteria, he or she will be referred to the Associate Dean for approval and processing.

Students are welcomed to transfer into the College of Geosciences from other universities and community colleges. Overall, the College of Geosciences requires a prospective student to have completed, or be in progress of completing, a minimum of 24 hours from a list of courses specific to each major outlined on page 56 of this catalog with a cumulative minimum GPR of 3.0. A B or better is required in certain courses if transferring into Meteorology. The College of Geosciences is also participating in the Program for Transfer Admission as well as the Program for System Admission in cooperation with Prairie View A&M University, Tarleton State University, Texas A&M International University, Texas A&M University-Commerce, Texas A&M University–Corpus Christi, Texas A&M University–Kingsville, West Texas A&M University and Texas A&M University–Texarkana.

Teacher Certification

The need for highly qualified teachers is high in the state of Texas. Students in the College of Geosciences are encouraged to consider pursuing a career in teaching. A number of pathways to certification are available. Interested students should consult with their advisors early in their programs and consult options outlined on the certification website. The college collaborates with the College of Science and the College of Education and Human Development on the aggieTEACH Program (http://aggieteach.tamu.edu) and in the University Studies degree program in secondary science teaching. Students in Geography may obtain composite social studies certification with a specialty in Geography through the Secondary Post-Baccalaureate Certification Program (8-12) or alternative certification options.

University Honors Programs

The College of Geosciences participates in the University Honors Programs, which is described in detail at Honors and Undergraduate Research (p. 92).

International and Cultural Diversity Requirement

Texas A&M University requires its students to meet an International and Cultural Diversity requirement as part of the Graduation requirements. Meeting this requirement will require the careful selection of courses. The student is directed to page 240 of this catalog for detailed information regarding this requirement and also is encouraged to seek the advice of the student’s academic advisor.

Curricula — College of Geosciences

- Environmental Geosciences
- Environmental Studies
- Geographic Information Science and Technology
- Geography
- Geology
- Geophysics
- Meteorology
- University Studies-Geography
- University Studies-GIST

Majors

College of Geosciences

- Bachelor of Science in Environmental Geosciences (p. 360)
- Bachelor of Science in Environmental Studies (p. 363)

Atmospheric Sciences

- Bachelor of Science in Meteorology (p. 372)
- Bachelor of Science in Meteorology and Master of Science in Oceanography, 5-Year Degree Program (p. 373)

Geography

- Bachelor of Science in Geographic Information Science and Technology, Computation, Design and Analysis Track (p. 376)
- Bachelor of Science in Geographic Information Science and Technology, Earth Systems and Analysis Track (p. 378)
- Bachelor of Science in Geographic Information Science and Technology, Human Systems and Society Track (p. 380)
- Bachelor of Science in Geography (p. 382)
- Bachelor of Science in Geography, Human Geography Track (p. 384)
- Bachelor of Science in Geography, Human Geography of the Natural Environment Track (p. 386)
- Bachelor of Science in Geography, Human-Environment Interactions Track (p. 388)
- Bachelor of Science in University Studies, Geographic Information Science and Technology Concentration (p. 390)
- Bachelor of Science in University Studies, Geography Concentration (p. 390)

Geology and Geophysics

- Bachelor of Arts in Geology (p. 393)
- Bachelor of Science in Geology, Environmental Geology Track (p. 394)
- Bachelor of Science in Geology, Petroleum Geology Track (p. 396)
- Bachelor of Science in Geophysics, Environmental Geophysics Track (p. 397)
- Bachelor of Science in Geophysics, Petroleum Geophysics Track (p. 398)
- Bachelor of Arts in Geology and Master of Science in Oceanography, 5-Year Degree Program (p. 399)
- Bachelor of Science in Geology and Master of Science in Oceanography, 5-Year Degree Program (p. 400)

Oceanography

- Bachelor of Science in Environmental Geosciences and Master of Science in Oceanography, 5-Year Degree Program (p. 366)

Minors
College of Geosciences

- Climate Change Minor (p. 369)
- Earth Sciences Minor (p. 369)
- Environmental Geosciences Minor (p. 370)

Department of Atmospheric Sciences

- Meteorology Minor (p. 373)

Department of Geography

- Geography Minor (p. 392)
- Geographic Information Science and Technology (GIST) Minor (p. 392)

Department of Geology and Geophysics

- Geology Minor (p. 402)
- Geophysics Minor (p. 402)

Department of Oceanography

- Oceanography Minor (p. 403)

Certificates

College of Geosciences

- Diversity Certificate in the College of Geosciences (p. 423)

Masters

College of Geosciences

- Master of Geoscience in Geoscience (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/geosciences/interdepartmental-degree-programs/mgsc)

Department of Atmospheric Sciences

- Master of Science in Atmospheric Sciences (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/geosciences/atmospheric-sciences/ms)

Department of Geography

- Master of Science in Geography (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/geosciences/geography/ms)

Department of Geology and Geophysics

- Master of Science in Geology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/geosciences/geology-geophysics/geology-ms)
- Master of Science in Geophysics (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/geosciences/geology-geophysics/geophysics-ms)

Department of Oceanography

- Master of Science in Oceanography (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/geosciences/oceanography/ms)

Doctoral

Department of Atmospheric Sciences

- Doctor of Philosophy in Atmospheric Sciences (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/geosciences/atmospheric-sciences/phd)

Department of Geography

- Doctor of Philosophy in Geography (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/geosciences/geography/phd)

Department of Geology and Geophysics

- Doctor of Philosophy in Geology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/geosciences/geology-geophysics/geology-phd)
- Doctor of Philosophy in Geophysics (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/geosciences/geology-geophysics/geophysics-phd)

Department of Oceanography

- Doctor of Philosophy in Oceanography (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/geosciences/oceanography/phd)

Environmental Geosciences - BS

The increasing demands that population growth and affluence put on the natural resources and the Earth’s environment require greater numbers of trained professionals and informed citizens. The BS degree in Environmental Geosciences embraces all the disciplines of geosciences to give the student a rigorous interdisciplinary education including issues associated with environmental policy. The degree trains students for employment by industry, environmental and engineering consulting firms, non-governmental organizations, and governmental regulatory agencies, among other entities. Students focus coursework in a particular environmental theme: coastal and marine environments, water, human impact on the environment, climate change, or biosphere.

Program Requirements

First Year
Fall
<table>
<thead>
<tr>
<th>Course</th>
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<td>BIOL 111 Introductory Biology I</td>
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<tr>
<td>ENGL 104 Composition and Rhetoric</td>
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<td>MATH 151 Engineering Mathematics I</td>
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Spring
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<td>BIOL 112 Introductory Biology II</td>
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<tr>
<td>MATH 152 Engineering Mathematics II</td>
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<td>POLS 206 American National Government</td>
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Second Year
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<tr>
<td>ATMO 201</td>
<td>Weather and Climate</td>
</tr>
<tr>
<td>&amp; ATMO 202</td>
<td>and Weather and Climate Laboratory</td>
</tr>
<tr>
<td>GEOG 203</td>
<td>Planet Earth</td>
</tr>
<tr>
<td>&amp; GEOG 213</td>
<td>and Planet Earth Lab</td>
</tr>
<tr>
<td>GEOL 101</td>
<td>Principles of Geology</td>
</tr>
<tr>
<td>OCNG 251</td>
<td>Oceanography</td>
</tr>
<tr>
<td>&amp; OCNG 252</td>
<td>and Oceanography Laboratory</td>
</tr>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
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<tr>
<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory</td>
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<tr>
<td>GEOG 201</td>
<td>Introduction to Human Geography</td>
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<td>Language, philosophy and culture elective (p. 21)</td>
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**Term Semester Credit Hours**: 14

**Spring**

Select one of the following: 3

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<thead>
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<td>and Weather and Climate Laboratory</td>
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<tr>
<td>GEOG 203</td>
<td>Planet Earth</td>
<td>3</td>
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<tr>
<td>&amp; GEOG 213</td>
<td>and Planet Earth Lab</td>
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<tr>
<td>GEOL 101</td>
<td>Principles of Geology</td>
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<tr>
<td>OCNG 251</td>
<td>Oceanography</td>
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<tr>
<td>&amp; OCNG 252</td>
<td>and Oceanography Laboratory</td>
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<td>Fundamentals of Chemistry II</td>
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<tr>
<td>&amp; CHEM 112</td>
<td>and Fundamentals of Chemistry Laboratory</td>
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<td>State and Local Government</td>
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**Term Semester Credit Hours**: 14

**Third Year**

**Fall**

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<td>GEOG 330</td>
<td>Resources and the Environment</td>
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<tr>
<td>PHYS 201</td>
<td>College Physics</td>
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<td>STAT 303</td>
<td>Statistical Methods</td>
<td>3</td>
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<tr>
<td>Environmental theme elective 4</td>
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<tr>
<td>Technical elective 5</td>
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Select one of the following:

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<thead>
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<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ATMO 321</td>
<td>Computer Applications in the Atmospheric Sciences</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 441</td>
<td>Satellite Meteorology and Remote Sensing</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 464</td>
<td>Laboratory Methods in Atmospheric Sciences</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 312</td>
<td>Data Analysis in Geography</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 361</td>
<td>Remote Sensing in Geosciences</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 380</td>
<td>Workshop in Environmental Studies</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 450</td>
<td>Field Geography</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 462/</td>
<td>Advanced GIS Analysis for Natural Sciences</td>
<td>3</td>
</tr>
<tr>
<td>ESSM 462</td>
<td>Resources Management</td>
<td>3</td>
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<tr>
<td>GEOG 467</td>
<td>Dynamic Modeling of Earth and Environmental Systems</td>
<td>3</td>
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<tr>
<td>GEOG 475</td>
<td>Advanced Topics in GIS (Geographic Information Systems)</td>
<td>3</td>
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<td>GEOG 476</td>
<td>GIS Practicum</td>
<td>3</td>
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<tr>
<td>GEOL 309</td>
<td>Introduction to Geological Field Methods</td>
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</tr>
<tr>
<td>GEOL 330</td>
<td>Geologic Field Trips</td>
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</tr>
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<td>GEOL 352/</td>
<td>GNSS in the Geosciences</td>
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<td>GEOG 352</td>
<td>Near-surface Geophysics</td>
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<tr>
<td>GEOP 413</td>
<td>Mathematical Modeling of Ocean Climate</td>
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**Term Semester Credit Hours**: 16

**Spring**

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<th>Title</th>
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<tbody>
<tr>
<td>GEC 309</td>
<td>Principles of Geographic Information Systems</td>
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<tr>
<td>POLS 420</td>
<td>Environmental Geology</td>
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<tr>
<td>Environmental policy elective 6</td>
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Select one of the following:

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<tr>
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<tbody>
<tr>
<td>AGEC 350</td>
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<td>BESC 367</td>
<td>U.S. Environmental Regulations</td>
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<td>ECON 202</td>
<td>Principles of Economics</td>
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<td>ECON 203</td>
<td>Principles of Economics</td>
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<tr>
<td>ECON 323</td>
<td>Microeconomic Theory</td>
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<td>Economics of Resource Scarcity</td>
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<tr>
<td>GEOG 304</td>
<td>Economic Geography</td>
<td>3</td>
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<td>GEOG 306</td>
<td>Introduction to Urban Geography</td>
<td>3</td>
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<td>GEOG 309</td>
<td>Geography of Energy</td>
<td>3</td>
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<td>GEOG 401</td>
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<td>Geographic Perspectives on Contemporary Urban Issues</td>
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<td>GEOG 430</td>
<td>Environmental Justice</td>
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<td>Environmental Ethics</td>
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<td>Politics of Energy and the Environment</td>
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<td>Environmental Impact Assessment</td>
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<td>SOCI 328</td>
<td>Environmental Sociology</td>
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<tr>
<td>URPN 202</td>
<td>Building Better Cities</td>
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<tr>
<td>URPN 460</td>
<td>Sustainable Communities</td>
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Environmental theme elective 4

Environmental theme elective 6

**Term Semester Credit Hours**: 16

**Fourth Year**

**Fall**

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<td>Technical elective 5</td>
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<td>ATMO 441</td>
<td>Satellite Meteorology and Remote Sensing</td>
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**Environmental Theme Elective**

**Technical Elective**

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</tbody>
</table>

1. Freshmen entering the program take a first year seminar, GEOS 101. The choice is not restricted. Students transferring or changing majors into the program, who have not taken GEOS 101, are required to take GEOS 481 in their junior or senior year.

2. It is recommended to select a course that also fulfills an International and Cultural Diversity requirement.

3. Choose one introductory College of Geosciences course in the first semester and an additional one in the second semester of the sophomore year. Seek guidance from the academic advisor for Environmental Programs in Geosciences (ENVP) or your faculty mentor.

4. Choose 18 hours of theme courses in your junior and senior years in consultation with your academic advisor or faculty mentor from the list below. GEOS 484 can be taken for up to 6 credits and will normally be used as an adjustment to theme electives, but depending on the content of the internship credit, it can be applied as an adjustment to your technical electives or policy electives. Seek guidance from the ENVP academic advisor.

5. Other courses which match the Environmental Programs' technical electives definition will be allowed by adjustment. Guidance about technical electives (including the definition used by the Environmental Programs in Geosciences) can be found on the programs' website. Seek guidance about choices from the ENVP academic advisor or faculty mentor.

6. Seek guidance about choices from the ENVP academic advisor or faculty mentor.

### Environmental Theme Electives

#### Climate Change

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>GEOG 310</td>
<td>Climate Change</td>
<td>3</td>
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<tr>
<td>GEOG 444</td>
<td>The Science and Politics of Global Climate Change</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 202</td>
<td>College Physics</td>
<td>4</td>
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Select the remaining courses from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ATMO 324</td>
<td>Physical and Regional Climatology</td>
</tr>
<tr>
<td>or GEOG 324</td>
<td>Global Climatic Regions</td>
</tr>
<tr>
<td>ATMO 363</td>
<td>Introduction to Atmospheric Chemistry and Air Pollution</td>
</tr>
<tr>
<td>ATMO 463</td>
<td>Air Pollution Meteorology</td>
</tr>
<tr>
<td>GEOL 305</td>
<td>Paleobiology</td>
</tr>
<tr>
<td>GEOL 306</td>
<td>Sedimentology and Stratigraphy</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours: 120
Select the remaining courses from the following:

- GEOG 331 Geomorphology 3
- GEOG 360 Natural Hazards 3
- GEOG 440 Engineering Geology 3
- GEOS 401 Polar Regions of the Earth: Science, Society and Discovery 3
- GEOS 484 Internship 6
- OCNG 401 Interdisciplinary Oceanography 3
- OCNG 425 Microbial Oceanography 3
- OCNG 440 Introduction to Chemical Oceanography 3
- SCSC 455 Environmental Soil and Water Science 3
- SCSC 458 Watershed and Water Quality Management 3

Biosphere

- GEG 335 Pattern and Process in Biogeography 3
- GEOL 305 Paleobiology 3
- OCNG 401 Interdisciplinary Oceanography 3
- OCNG 425 Microbial Oceanography 3
- SCSC 455 Environmental Soil and Water Science 3
- SCSC 458 Watershed and Water Quality Management 3

Select the remaining courses from the following:

- GEG 442 Past Climates 3
- GEG 433 Principles of Plant Geography 3
- GEG 401 Interdisciplinary Oceanography 3
- BIOL 214 Genes, Ecology and Evolution 3
- BIOL 357 Ecology 4
- & BIOL 358 and Ecology Laboratory 4
- GENE 302 Principles of Genetics 4
- & GENE 312 and Comprehensive Genetics Laboratory 4
- GENE 412 Population and Ecological Genetics 3
- SCSC 301 Soil Science 4
- MEPS 316 Introduction to Theory and Practice of Plant Physiology 3

1 Students who have taken OCNG 251 cannot take OCNG 401.

Two courses in the degree plan must be writing intensive courses designated by the Environmental Programs in the schedule of classes. Also, international and cultural diversity electives (6 hours) must be incorporated into the degree.

Environmental Studies - BS

The increasing demands that population growth and affluence put on the natural resources and the Earth’s environment require greater numbers of trained professionals and informed citizens. The Bachelor of Science
degree in Environmental Studies blends science and policy with an interdisciplinary understanding of Earth’s processes and policy aspects of human interactions with the environment. The degree is designed to educate students about our planet to enable them to be knowledgeable about the scientific, human-dimension and policy aspects of environmental issues facing our nation as they work in regulatory agencies, industry, and non-governmental organizations.

### Program Requirements

#### First Year

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<th>Fall Semester</th>
<th>Credit Hours</th>
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<td>ATMO 201</td>
<td>4</td>
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<tr>
<td>&amp; ATMO 202</td>
<td>&amp; Weather and Climate Laboratory</td>
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<tr>
<td>GEOG 203</td>
<td>3</td>
</tr>
<tr>
<td>&amp; GEOG 213</td>
<td>&amp; Planet Earth Lab</td>
</tr>
<tr>
<td>GEOL 101</td>
<td>3</td>
</tr>
<tr>
<td>OCNG 251</td>
<td>3</td>
</tr>
<tr>
<td>&amp; OCNG 252</td>
<td>&amp; Oceanography Laboratory</td>
</tr>
<tr>
<td>GEOS 101</td>
<td>1</td>
</tr>
<tr>
<td>Introduction to the Geosciences</td>
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<tr>
<td>GEOS 105</td>
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<tr>
<td>Introduction to Environmental Geoscience</td>
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<tr>
<td>MATH 141</td>
<td>3</td>
</tr>
<tr>
<td>Business Mathematics I</td>
<td></td>
</tr>
<tr>
<td>POLS 206</td>
<td>3</td>
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<tr>
<td>American National Government</td>
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#### Term Semester Credit Hours

|  |  |
|  | 14 |

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<tr>
<td>ATMO 202</td>
<td>&amp; Weather and Climate Laboratory</td>
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<tr>
<td>GEOG 203</td>
<td>3</td>
</tr>
<tr>
<td>&amp; GEOG 213</td>
<td>&amp; Planet Earth Lab</td>
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<tr>
<td>GEOL 101</td>
<td>3</td>
</tr>
<tr>
<td>OCNG 251</td>
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<tr>
<td>&amp; OCNG 252</td>
<td>&amp; Oceanography Laboratory</td>
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<tr>
<td>ENGL 104</td>
<td>3</td>
</tr>
<tr>
<td>Composition and Rhetoric</td>
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<tr>
<td>GEG 201</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Human Geography</td>
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<td>MATH 142</td>
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<td>Business Mathematics II</td>
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<tr>
<td>Creative arts elective (p. 22)</td>
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#### Term Semester Credit Hours

|  | 16 |

#### Second Year

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<tr>
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<td>ECON 202</td>
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<tr>
<td>Principles of Economics</td>
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<tr>
<td>GEOG 205 or</td>
<td>3</td>
</tr>
<tr>
<td>GEOS 210</td>
<td>&amp; Environmental Change or Climate Change</td>
</tr>
<tr>
<td>POLS 207</td>
<td>3</td>
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<td>State and Local Government</td>
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<td>Communication elective (p. 20)</td>
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<td>Life and physical sciences elective</td>
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<td>Select one of the following:</td>
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<td>BIOL 101</td>
<td>4</td>
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<tr>
<td>Botany</td>
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<tr>
<td>BIOL 107</td>
<td>3</td>
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<tr>
<td>Zoology</td>
<td></td>
</tr>
<tr>
<td>BIOL 111</td>
<td>3</td>
</tr>
<tr>
<td>Introductory Biology I</td>
<td></td>
</tr>
<tr>
<td>BIOL 112</td>
<td>3</td>
</tr>
<tr>
<td>Introductory Biology II</td>
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<table>
<thead>
<tr>
<th>Spring Semester</th>
<th>Credit Hours</th>
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<tbody>
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<tr>
<td>CHEM 101</td>
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<tr>
<td>Fundamentals of Chemistry I</td>
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<tr>
<td>&amp; CHEM 111</td>
<td>&amp; Fundamentals of Chemistry Laboratory I</td>
</tr>
<tr>
<td>CHEM 102</td>
<td>3</td>
</tr>
<tr>
<td>Fundamentals of Chemistry II</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 112</td>
<td>&amp; Fundamentals of Chemistry Laboratory II</td>
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#### Term Semester Credit Hours

|  | 16 |

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<td>ATMO 321</td>
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<td>Computer Applications in the Atmospheric Sciences</td>
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<tr>
<td>ATMO 326</td>
<td>3</td>
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<tr>
<td>Environmental Atmospheric Science</td>
<td></td>
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<tr>
<td>ATMO 363</td>
<td>3</td>
</tr>
<tr>
<td>Introduction to Atmospheric Chemistry and Air Pollution</td>
<td></td>
</tr>
<tr>
<td>ATMO 463</td>
<td>3</td>
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<tr>
<td>Air Pollution Meteorology</td>
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<td>ATMO 491</td>
<td>3</td>
</tr>
<tr>
<td>Research</td>
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<tr>
<td>GEOG 325</td>
<td>3</td>
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<tr>
<td>Geography of Europe</td>
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<td>GEOG 324</td>
<td>3</td>
</tr>
<tr>
<td>Global Climatic Regions</td>
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<td>GEOG 331</td>
<td>3</td>
</tr>
<tr>
<td>Geomorphology</td>
<td></td>
</tr>
<tr>
<td>GEOG 352/</td>
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<tr>
<td>GEOL 352</td>
<td>&amp; GNSS in the Geosciences</td>
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<tr>
<td>GEOG 360</td>
<td>3</td>
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<tr>
<td>Natural Hazards</td>
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<td>GEOG 361</td>
<td>3</td>
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<tr>
<td>Remote Sensing in Geosciences</td>
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<td>GEOG 370/</td>
<td>3</td>
</tr>
<tr>
<td>Coastal Processes</td>
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<td>MARS 370</td>
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<td>GEOG 400</td>
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<td>Arid Lands Geomorphology</td>
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<td>GEOG 404</td>
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<tr>
<td>Spatial Thinking, Perception and Behavior</td>
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<td>GEOG 434</td>
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<tr>
<td>Hydrology and Environment</td>
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<td>GEOG 435</td>
<td>3</td>
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<tr>
<td>Principles of Plant Geography</td>
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<td>GEOG 442/</td>
<td>3</td>
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<tr>
<td>GEOS 442</td>
<td>&amp; Past Climates</td>
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<td>GEOG 450</td>
<td>3</td>
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<tr>
<td>Field Geography</td>
<td></td>
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<td>GEOG 467</td>
<td>3</td>
</tr>
<tr>
<td>Dynamic Modeling of Earth and Environmental Systems</td>
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<td>GEOG 475</td>
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<tr>
<td>Advanced Topics in GIS (Geographic Information Systems)</td>
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<td>GEOG 491</td>
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<td>Research</td>
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<td>GEOL 420</td>
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<tr>
<td>Environmental Geology</td>
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<td>GEOL 491</td>
<td>3</td>
</tr>
<tr>
<td>Research</td>
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<tr>
<td>GEOS 401</td>
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<tr>
<td>Polar Regions of the Earth: Science, Society and Discovery</td>
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<td>GEOS 410</td>
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<tr>
<td>Global Change</td>
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<td>GEOS 491</td>
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<td>Research</td>
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<td>OCNG 350</td>
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<td>Marine Pollution</td>
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<td>OCNG 420</td>
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<tr>
<td>Introduction to Biological Oceanography</td>
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<td>OCNG 425</td>
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<td>Microbial Oceanography</td>
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<tr>
<td>OCNG 430</td>
<td>3</td>
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<tr>
<td>Introduction to Geological Oceanography</td>
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<td>OCNG 440</td>
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<td>Introduction to Chemical Oceanography</td>
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<td>OCNG 491</td>
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<tr>
<td>Research</td>
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<tr>
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<tr>
<td>Course Code</td>
<td>Course Title</td>
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<tr>
<td>-------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>BIOL 101</td>
<td>Botany</td>
</tr>
<tr>
<td>BIOL 107</td>
<td>Zoology</td>
</tr>
<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
</tr>
<tr>
<td>BIOL 112</td>
<td>Introductory Biology II</td>
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<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
</tr>
<tr>
<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
</tr>
<tr>
<td>CHEM 102</td>
<td>Fundamentals of Chemistry II</td>
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<tr>
<td>&amp; CHEM 112</td>
<td>and Fundamentals of Chemistry Laboratory II</td>
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<td>Free elective</td>
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### Term Semester Credit Hours 16

#### Third Year

**Fall**

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<th>Course Title</th>
<th>Term</th>
<th>Semester</th>
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<tr>
<td>AGEC 350</td>
<td>Environmental and Natural Resource Economics</td>
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<tr>
<td>GEOG 330</td>
<td>Resources and the Environment</td>
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<td></td>
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<tr>
<td>GEOG 335</td>
<td>Pattern and Process in Biogeography</td>
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<td></td>
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</tr>
<tr>
<td>STAT 303</td>
<td>Statistical Methods</td>
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<td>Geoscience elective</td>
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Select one of the following:

- ATMO 321 Computer Applications in the Atmospheric Sciences
- ATMO 326 Environmental Atmospheric Science
- ATMO 363 Introduction to Atmospheric Chemistry and Air Pollution
- ATMO 491 Research
- GEOG 324 Global Climatic Regions
- GEOG 331 Geomorphology
- GEOG 352/GEOL 352 GNSS in the Geosciences
- GEOG 360 Natural Hazards
- GEOG 370/MARS 370 Coastal Processes
- GEOG 400 Arid Lands Geomorphology
- GEOG 404 Spatial Thinking, Perception and Behavior
- GEOG 434 Hydrology and Environment
- GEOG 435 Principles of Plant Geography
- GEOG 442/GEOS 442 Past Climates
- GEOG 450 Field Geography
- GEOG 467 Dynamic Modeling of Earth and Environmental Systems
- GEOG 475 Advanced Topics in GIS (Geographic Information Systems)
- GEOG 491 Research
- GEOL 420 Environmental Geology
- GEOL 491 Research
- GEOS 401 Polar Regions of the Earth: Science, Society and Discovery
- GEOS 410 Global Change
- GEOS 491 Research
- OCNG 350 Marine Pollution
- OCNG 420 Introduction to Biological Oceanography
- OCNG 425 Microbial Oceanography
- OCNG 430 Introduction to Geological Oceanography
- OCNG 440 Introduction to Chemical Oceanography
- OCNG 491 Research

**Spring**

<table>
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<th>Course Title</th>
<th>Term</th>
<th>Semester</th>
<th>Credit Hours</th>
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<td>GEOG 380</td>
<td>Workshop in Environmental Studies</td>
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<tr>
<td>GEOG 390</td>
<td>Principles of Geographic Information Systems</td>
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<tr>
<td>Environmental policy elective</td>
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Select one of the following:

- BESC 367 U.S. Environmental Regulations
- ECON 203 Principles of Economics
- ECON 323 Microeconomic Theory
- ECON 435 Economics of Resource Scarcity
- GEOG 306 Introduction to Urban Geography
- GEOG 309 Geography of Energy
- GEOG 401 Political Geography
- GEOG 406 Geographic Perspectives on Contemporary Urban Issues
- GEOG 430 Environmental Justice
- GEOS 444 The Science and Politics of Global Climate Change
- GEOS 484 Internship
- POLS 347 Politics of Energy and the Environment
- SOCI 328 Environmental Sociology
- URPN 202 Building Better Cities
- URPN 360 Issues in Environmental Quality
- URPN 371 Environmental Health Planning and Policy
- URPN 460 Sustainable Communities

**Term Semester Credit Hours 15**

#### Fourth Year

**Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term</th>
<th>Semester</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>GEOG 304</td>
<td>Economic Geography</td>
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<tr>
<td>GEOS 430</td>
<td>Global Science and Policy Making</td>
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<td>Environmental policy elective</td>
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</table>

Select one of the following:

- BESC 367 U.S. Environmental Regulations
- ECON 203 Principles of Economics
- ECON 323 Microeconomic Theory
- ECON 435 Economics of Resource Scarcity
- GEOG 306 Introduction to Urban Geography
- GEOG 309 Geography of Energy
- GEOG 401 Political Geography
- GEOG 406 Geographic Perspectives on Contemporary Urban Issues
- GEOG 430 Environmental Justice
- GEOS 444 The Science and Politics of Global Climate Change

**Term Semester Credit Hours 13**
College of Geosciences

<table>
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<th>Term Semester Credit Hours</th>
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<td>GEOS 484</td>
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<tr>
<td>POLS 347</td>
<td>Politics of Energy and the Environment</td>
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<tr>
<td>SOCI 328</td>
<td>Environmental Sociology</td>
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<tr>
<td>URPN 202</td>
<td>Building Better Cities</td>
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<tr>
<td>URPN 360</td>
<td>Issues in Environmental Quality</td>
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</tr>
<tr>
<td>URPN 371</td>
<td>Environmental Health Planning and Policy</td>
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</tr>
<tr>
<td>URPN 460</td>
<td>Sustainable Communities</td>
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<tr>
<td>Free elective</td>
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</table>

**Term Semester Credit Hours**: 15

**Total Semester Credit Hours**: 120

1. Freshman entering the program take a first year seminar, GEOS 101. The choice is not restricted. Students transferring or changing majors into the program, who have not taken GEOS 101, are required to take GEOS 481 in their junior or senior year.

2. It is recommended to select a course that also fulfills an international and cultural diversity requirement.

3. Seek guidance about choices from the ENVP academic advisor or faculty mentor.

4. Other courses which match the ENVP technical electives definition will be allowed by adjustment. Guidance about technical electives (including the definition used by the Environmental Programs in Geosciences) can be found on the programs’ website. Seek guidance about choices from the ENVP academic advisor or faculty mentor.

Environmental Geosciences - 5-Year Bachelor of Science/Master of Science in Oceanography

The Fast Track Program offers motivated and exceptional students the opportunity to achieve aspirations in an efficient program at Texas A&M, completing the Bachelor of Science (B.S.) degree in the Environmental Geosciences program and the Oceanography non-thesis M.S. degree in 5 years. There will be only two courses used for dual credit in this program. There is a total of 150 hours of coursework. The concurrent degree program will enable these motivated students to coordinate the required B.S. coursework (114 undergraduate credit hours plus 6 dual credit graduate courses) and non-thesis M.S. coursework (36 credit hours including the 6 dual credit graduate courses) to complete the required credit hours for each degree without diminishing scope or quality of work and within 5 years.

**Application and Eligibility:**

- Applications to the Fast Track program will be submitted by July 1 after the completion of the student’s junior year. Applications submitted after that time will be evaluated on a case by case basis.
- Applicants must have a minimum undergraduate GPR of 3.0. Applicants must also earn a C or better in all Chemistry, Calculus and Physics courses. Once admitted to the program, students must maintain a minimum 3.0 GPR.
- A faculty advisor will be assigned to each student. Students may seek additional mentors, but a formal committee is not required.
- Students admitted into the Fast Track program must finish the entire 150 credit hours to obtain both the Bachelor’s and Master’s degrees.
These students will be conferred with two degrees once they complete the 5th year of the concurrent program.

- Students admitted to the program will change from U4 to G7 status when they are admitted having completed at least 96 hours (end of spring semester, year 3).
- Students not accepted or not allowed to continue with the Fast Track Program will complete the 120 hour Bachelor's degree under the standard 4 year curriculum. These students may still apply to the traditional graduate program.
- Students will graduate at the completion of the 5th year in the Fast Track Program coursework (150 credit hours) with both Bachelor’s and Master’s degrees. Students will complete the coursework in May of the 5th year.

Program Requirements

First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOS 105</td>
<td>3</td>
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<tr>
<td>BIOL 111</td>
<td>4</td>
</tr>
<tr>
<td>MATH 151</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>3</td>
</tr>
<tr>
<td>GEOS 101</td>
<td>1</td>
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</table>

<table>
<thead>
<tr>
<th>Term Semester Credit Hours 15</th>
</tr>
</thead>
</table>

Spring

| POLS 206        | American National Government 3        |
| BIOL 112       | Introductory Biology II 4             |
| MATH 152       | Engineering Mathematics II 4          |
| American history (p. 23) 3 |
| Language, philosophy and culture (p. 21) 2 |

| Term Semester Credit Hours 17 |

Second Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select one of the following: 4</td>
<td></td>
</tr>
<tr>
<td>ATMO 201</td>
<td>Weather and Climate</td>
</tr>
<tr>
<td>&amp; ATMO 202</td>
<td>and Weather and Climate Laboratory</td>
</tr>
<tr>
<td>GEOG 203</td>
<td>Planet Earth</td>
</tr>
<tr>
<td>&amp; GEOG 213</td>
<td>and Planet Earth Lab</td>
</tr>
<tr>
<td>GEOL 101</td>
<td>Principles of Geology</td>
</tr>
<tr>
<td>OCNG 251</td>
<td>Oceanography</td>
</tr>
<tr>
<td>&amp; OCNG 252</td>
<td>and Oceanography Laboratory</td>
</tr>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I 4</td>
</tr>
<tr>
<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
</tr>
<tr>
<td>GEOG 201</td>
<td>Introduction to Human Geography 3</td>
</tr>
<tr>
<td>American history (p. 23) 3</td>
<td></td>
</tr>
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</table>

| Environmental Policy Elective 3 |

| Select one of the following: |
| AGEC 350 Environmental and Natural Resource Economics |
| BESC 367 U.S. Environmental Regulations |
| ECON 202 Principles of Economics |
| ECON 203 Principles of Economics |
| ECON 323 Microeconomic Theory |
| ECON 435 Economics of Resource Scarcity |
| GEOG 304 Economic Geography |
| GEOG 306 Introduction to Urban Geography |
| GEOG 309 Geography of Energy |
| GEOG 401 Political Geography |
| GEOG 406 Geographic Perspectives on Contemporary Urban Issues |
| GEOG 430 Environmental Justice |
| PHIL 314 Environmental Ethics |
| POLS 347 Politics of Energy and the Environment |
| RENR 470 Environmental Impact Assessment |
| SOCI 328 Environmental Sociology |
| URPN 202 Building Better Cities |
| URPN 360 Issues in Environmental Quality |
| URPN 371 Environmental Health Planning and Policy |
| URPN 460 Sustainable Communities |

<table>
<thead>
<tr>
<th>Spring</th>
<th>Semester Credit Hours 17</th>
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<tbody>
<tr>
<td>Select one of the following: 4</td>
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<tr>
<td>ATMO 201 Weather and Climate</td>
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<tr>
<td>&amp; ATMO 202 and Weather and Climate Laboratory</td>
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</tr>
<tr>
<td>GEOG 203 Planet Earth</td>
<td></td>
</tr>
<tr>
<td>&amp; GEOG 213 and Planet Earth Lab</td>
<td></td>
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<tr>
<td>GEOL 101 Principles of Geology</td>
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<tr>
<td>OCNG 251 Oceanography</td>
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</tr>
<tr>
<td>&amp; OCNG 252 and Oceanography Laboratory</td>
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</tr>
<tr>
<td>CHEM 102 Fundamentals of Chemistry II 4</td>
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<tr>
<td>&amp; CHEM 112 and Fundamentals of Chemistry Laboratory II</td>
<td></td>
</tr>
<tr>
<td>POLS 207 State and Local Government 3</td>
<td></td>
</tr>
<tr>
<td>Technical elective 3</td>
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| Select one of the following: |
| ATMO 321 Computer Applications in the Atmospheric Sciences |
| ATMO 441 Satellite Meteorology and Remote Sensing |
| ATMO 464 Laboratory Methods in Atmospheric Sciences |
| GEOG 312 Data Analysis in Geography |
| GEOG 361 Remote Sensing in Geosciences |
| GEOG 380 Workshop in Environmental Studies |
| GEOG 450 Field Geography |
| GEOG 462/ ESSM 462 Advanced GIS Analysis for Natural Resources Management |
| GEOG 467 Dynamic Modeling of Earth and Environmental Systems |
| GEOG 475 Advanced Topics in GIS (Geographic Information Systems) |
| GEOG 476 GIS Practicum |
| GEOL 309 Introduction to Geological Field Methods |
| GEOL 330 Geologic Field Trips |
| GEOL 352/ GNSS in the Geosciences |
| GEOL 352/ GNSS in the Geosciences |
| GEOP 413 Near-surface Geophysics |
### Third Year

<table>
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<th>Term</th>
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<th>Fall</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>STAT 303 Statistical Methods 3</td>
<td>OCNG 603 Communicating Ocean Science 3</td>
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<td>PHYS 218 Mechanics 4</td>
<td>OCNG 657 Data Methods and Graphical Representation in Oceanography 4</td>
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<td>GEG 330 Resources and the Environment 3</td>
<td>Fundamentals of Ocean Science Course 3</td>
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<td></td>
<td>Coastal and Marine Environments theme elective 3</td>
<td>Select one of the following:</td>
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<tr>
<td></td>
<td></td>
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<td>OCNG 620 Biological Oceanography</td>
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<td>OCNG 630 Geological Oceanography</td>
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<td></td>
<td></td>
<td>OCNG 640 Chemical Oceanography</td>
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<td>Technical elective 6</td>
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<td></td>
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<td>ATMO 321 Computer Applications in the Atmospheric Sciences</td>
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<td>ATMO 441 Satellite Meteorology and Remote Sensing</td>
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<td>GEG 312 Data Analysis in Geography</td>
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<td></td>
<td>GEG 361 Remote Sensing in Geosciences</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GEG 380 Workshop in Environmental Studies</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>GEG 450 Field Geography</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GEG 462/ ESSM 462 Resources Management</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>GEG 467 Dynamic Modeling of Earth and Environmental Systems</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>GEG 475 Advanced Topics in GIS (Geographic Information Systems)</td>
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<tr>
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<td></td>
<td></td>
<td>GEG 476 GIS Practicum</td>
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<td></td>
<td>GEOL 309 Introduction to Geological Field Methods</td>
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<td>GEOL 330 Geologic Field Trips</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>GEOL 352/ GNSS in the Geosciences</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>GEOP 413 Near-surface Geophysics</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>OCNG 451 Mathematical Modeling of Ocean Climate</td>
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### Fourth Year

<table>
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<th>Semester Credit Hours</th>
<th>Fall</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>GEOS 405 Environmental Geosciences 3</td>
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<tr>
<td></td>
<td></td>
<td>GEG 390 Principles of Geographic Information Systems 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>OCNG 604 Ocean Observing Systems 3</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>OCNG 608 Physical Oceanography 3</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td>Fundamentals of Ocean Science Course 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Select one of the following:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>OCNG 620 Biological Oceanography</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>OCNG 630 Geological Oceanography</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td>OCNG 640 Chemical Oceanography</td>
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### Fifth Year

<table>
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<th>Term</th>
<th>Semester Credit Hours</th>
<th>Fall</th>
<th>Spring</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Advanced specialized OCNG graduate course 3</td>
<td></td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Advanced specialized OCNG graduate course 3</td>
<td></td>
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<td>Term Semester Credit Hours: 9</td>
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<tr>
<td></td>
<td></td>
<td>Advanced specialized OCNG graduate course 3</td>
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<td></td>
<td></td>
<td>Advanced specialized OCNG graduate course 3</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Capstone Experience 3</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Total Semester Credit Hours: 18</td>
<td></td>
</tr>
</tbody>
</table>

**Creative Arts (p. 22)** 3

**Term Semester Credit Hours** 16
1 Freshmen entering the program take a first year seminar, GEOS 101. The choice is not restricted. Students transferring or changing majors into the program, who have not taken GEOS 101, are required to take GEOS 481 in their junior or senior year.

2 It is recommended to select a course that also fulfills an International and Cultural Diversity (p. 34) requirement.

3 Select from course list below. If students use nine credits of allowed OCNG courses (e.g. OCNG 401, OCNG 350, OCNG 451, OCNG 485) as Coastal and Marine Environments theme electives, they will receive an OCNG minor with their BS in ENGS degree. If one of the Introductory Geoscience course and associated labs listed in Year Two is OCNG 251 with OCNG 252, then only two (six credits) of the theme electives needs to be from OCNG to still get the minor.

4 Students will not be permitted to receive credit for both the 400- and 600-level versions of certain courses because the content and learning outcomes are too similar (e.g. OCNG 440/OCNG 640; GEOS 470/OCNG 657).

5 These two graduate courses will be taken for dual undergraduate/graduate credit and will contribute to the minor.

**Coastal and Marine Environments Theme List**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 370/ MARS 370</td>
<td>Coastal Processes</td>
<td>3</td>
</tr>
<tr>
<td>OCNG 401</td>
<td>Interdisciplinary Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>Select the remaining courses from the following:</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>GEOG 331</td>
<td>Geomorphology</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 360</td>
<td>Natural Hazards</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 306</td>
<td>Sedimentology and Stratigraphy</td>
<td>4</td>
</tr>
<tr>
<td>GEOL 440</td>
<td>Engineering Geology</td>
<td>3</td>
</tr>
<tr>
<td>GEOS 444</td>
<td>The Science and Politics of Global Climate Change</td>
<td>3</td>
</tr>
<tr>
<td>GEOS 484</td>
<td>Internship</td>
<td>0-6</td>
</tr>
<tr>
<td>OCNG 350</td>
<td>Marine Pollution</td>
<td>3</td>
</tr>
<tr>
<td>OCNG 410</td>
<td>Introduction to Physical Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>OCNG 420</td>
<td>Introduction to Biological Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>OCNG 425</td>
<td>Microbial Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>OCNG 430</td>
<td>Introduction to Geological Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>OCNG 440</td>
<td>Introduction to Chemical Oceanography</td>
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</tr>
<tr>
<td>WFSC 418</td>
<td>Ecology of the Coastal Zone</td>
<td>3</td>
</tr>
<tr>
<td>WFSC 425</td>
<td>Marine Fisheries</td>
<td>3</td>
</tr>
<tr>
<td>WFSC 428</td>
<td>Wetland Ecosystem Management</td>
<td>4</td>
</tr>
</tbody>
</table>

Two courses in the degree plan must be writing intensive courses designated by the Environmental Programs in the schedule of classes. Also, international and cultural diversity electives (6 hours) must be incorporated into the degree.

Any of the required courses may be taken during the summer sessions to diminish the heavy semester loads during Years 2 and 3.

**Climate Change - Minor**

The College of Geosciences offers a minor in Climate Change. For specific program information, please reference the program requirements.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOS 210</td>
<td>Climate Change</td>
<td>3</td>
</tr>
<tr>
<td>Select the remaining courses from the following:</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

**Earth Sciences - Minor**

The purpose of the Earth Sciences minor is to study the different physical earth processes and systems.

Students choosing to complete a minor in Earth Sciences must meet the following requirements:

- A minimum of 6 hours must be taken in residence at either Texas A&M University/College Station or Galveston.
- A minimum cumulative GPR of 2.0 must be achieved for all courses in the minor.
- Take a minimum of 16 hours of coursework, of which 3 hours of GEOS 210 Climate Change are required.
- The remaining 13 hours must include at least 3 hours of 400-level coursework and another 3 hours of upper-level (300- or 400-level) coursework from the list.
- Students with majors in the College of Geosciences must select only courses outside of their home department.

**Program Requirements**

Select courses from at least three of the following five groups: 15

**Group 1**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATMO 201</td>
<td>Weather and Climate</td>
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</tr>
<tr>
<td>or GEOS 202</td>
<td>Introduction to Environmental Geoscience</td>
<td>105</td>
</tr>
<tr>
<td>GEOG 309</td>
<td>Geography of Energy</td>
<td></td>
</tr>
<tr>
<td>GEOG 324</td>
<td>Global Climatic Regions</td>
<td></td>
</tr>
<tr>
<td>GEOG 442</td>
<td>Past Climates</td>
<td></td>
</tr>
<tr>
<td>442/GEOS 442</td>
<td></td>
<td>442</td>
</tr>
<tr>
<td>GEOS 401</td>
<td>Polar Regions of the Earth: Science, Society and Discovery</td>
<td></td>
</tr>
<tr>
<td>GEOS 410</td>
<td>Global Change</td>
<td></td>
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<tr>
<td>GEOS 444</td>
<td>The Science and Politics of Global Climate Change</td>
<td>3</td>
</tr>
<tr>
<td>GEOS 481</td>
<td>Seminar</td>
<td></td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours** 16

Students choosing to complete a minor in Climate Change must meet the following requirements:

- A minimum of 6 hours must be taken in residence at either Texas A&M University/College Station or Galveston.
- A minimum cumulative GPR of 2.0 must be achieved for all courses in the minor.
- Take a minimum of 16 hours of coursework, of which 3 hours of GEOS 210 Climate Change are required.
- The remaining 13 hours must include at least 3 hours of 400-level coursework and another 3 hours of upper-level (300- or 400-level) coursework from the list.
- Students with majors in the College of Geosciences must select only courses outside of their home department.
### Group 2

<table>
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<tr>
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<th>Course Title</th>
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<tbody>
<tr>
<td>GEOG 203</td>
<td>Planet Earth</td>
</tr>
<tr>
<td>GEOG 309</td>
<td>Geography of Energy</td>
</tr>
<tr>
<td>GEOG 324</td>
<td>Global Climatic Regions</td>
</tr>
<tr>
<td>GEOG 331</td>
<td>Geomorphology</td>
</tr>
<tr>
<td>GEOG 360</td>
<td>Natural Hazards</td>
</tr>
<tr>
<td>GEOG 361</td>
<td>Remote Sensing in Geosciences</td>
</tr>
<tr>
<td>GEOG 370/MARS</td>
<td>Coastal Processes</td>
</tr>
<tr>
<td>GEOG 390</td>
<td>Principles of Geographic Information Systems</td>
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<tr>
<td>GEOG 400</td>
<td>Arid Lands Geomorphology</td>
</tr>
<tr>
<td>GEOG 434</td>
<td>Hydrology and Environment</td>
</tr>
<tr>
<td>GEOG 462/ESSM</td>
<td>Advanced GIS Analysis for Natural Resources Management</td>
</tr>
<tr>
<td>GEOG 467</td>
<td>Dynamic Modeling of Earth and Environmental Systems</td>
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### Group 3

<table>
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<tbody>
<tr>
<td>GEOL 101</td>
<td>Principles of Geology</td>
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<tr>
<td>or GEOL 104</td>
<td>or Physical Geology</td>
</tr>
<tr>
<td>GEOL 203</td>
<td>Mineralogy</td>
</tr>
<tr>
<td>GEOL 301</td>
<td>Mineral Resources</td>
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<td>GEOL 302</td>
<td>Introduction to Petrology</td>
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<tr>
<td>GEOL 306</td>
<td>Sedimentology and Stratigraphy</td>
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<td>GEOL 308</td>
<td>Integrated Earth Science</td>
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<td>GEOL 312</td>
<td>Structural Geology and Tectonics</td>
</tr>
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<td>GEOL 410</td>
<td>Hydrogeology</td>
</tr>
<tr>
<td>GEOP 341</td>
<td>Global Geophysics</td>
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<td>GEOP 413</td>
<td>Near-surface Geophysics</td>
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### Group 4

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<td>GEOS 401</td>
<td>Polar Regions of the Earth: Science, Society and Discovery</td>
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<tr>
<td>GEOS 442/444</td>
<td>Past Climates</td>
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<td>GEOG 442</td>
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<td>GEOS 470</td>
<td>Data Analysis Methods in Geosciences</td>
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### Group 5

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCNG 251</td>
<td>Oceanography</td>
</tr>
<tr>
<td>or OCNG 401</td>
<td>or Interdisciplinary Oceanography</td>
</tr>
<tr>
<td>OCNG 252</td>
<td>Oceanography Laboratory</td>
</tr>
<tr>
<td>OCNG 410</td>
<td>Introduction to Physical Oceanography</td>
</tr>
<tr>
<td>OCNG 430</td>
<td>Introduction to Geological Oceanography</td>
</tr>
<tr>
<td>OCNG 440</td>
<td>Introduction to Chemical Oceanography</td>
</tr>
</tbody>
</table>

### Environmental Geosciences - Minor

The purpose of the Environmental Geosciences minor is to study the environmental impacts on the different earth systems.

Students in the Environmental Programs are not allowed to declare Environmental Geosciences as a minor.

Students of other disciplines choosing to complete a minor in Environmental Geosciences must meet the following requirements:

- A minimum of 6 hours must be taken in residence at either Texas A&M University/College Station or Galveston.
- A minimum cumulative GPR of 2.0 must be achieved for all courses in the minor.
- Take a minimum of 15 hours of coursework in the College of Geosciences, of which 3 hours of GEOS 105 is required.
- The remaining 12 hours must include at least 3 hours of 400-level coursework and another 3 hours of upper-level (300- or 400-level) coursework from the list.
- Students with majors in the College of Geosciences must select only courses outside of their home department.

### Program Requirements

Some of the courses have prerequisites so make sure to check the catalog before enrolling in the course.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOS 105</td>
<td>Introduction to Environmental Geoscience</td>
</tr>
</tbody>
</table>

Select remaining courses from at least three of the following five groups.  

**Group 1**

- ATMO 326 Environmental Atmospheric Science
- ATMO 363 Introduction to Atmospheric Chemistry and Air Pollution
- ATMO 463 Air Pollution Meteorology
- ATMO 464 Laboratory Methods in Atmospheric Sciences

**Group 2**

- GEOG 205 Environmental Change
- GEOG 309 Geography of Energy
- GEOG 330 Resources and the Environment
- GEOG 380 Workshop in Environmental Studies
- GEOG 430 Environmental Justice
- GEOG 467 Dynamic Modeling of Earth and Environmental Systems

**Group 3**

- GEOL 410 Hydrogeology
- GEOL 420 Environmental Geology
- GEOL 451 Introduction to Geochemistry

**Group 4**

- GEOS 210 Climate Change
- GEOS 410 Global Change
- GEOS 430 Global Science and Policy Making
- GEOS 444 The Science and Politics of Global Climate Change

**Group 5**

- OCNG 420 Introduction to Biological Oceanography

At least 6 hours must be upper level, 3 of which must be 400 level.

Students with majors in the College of Geosciences must select only courses outside of their home department.

Some of the courses have prerequisites, so make sure to check the catalog before enrolling in the course.
OCNG 440 Introduction to Chemical Oceanography

Total Semester Credit Hours 15

1 At least 6 hours must be upper level, 3 of which must be 400 level.

Diversity - Certificate

The College of Geosciences, in collaboration with the Department of Multicultural Services, offers a Diversity Certificate program for Geosciences majors. The goal of the program is two-fold:

1. to offer Geosciences students an opportunity to synthesize and integrate academic coursework with co-curricular and service learning experiences to demonstrate their preparedness to participate successfully in contemporary, highly diverse global societies; and
2. to promote diversity, multiculturalism, and internationalism in the College of Geosciences.

Program Requirements

Certificate requirements include nine semester hours of diversity-related courses, at least one of which must be from the College of Geosciences, and completion of a special section of GEOS 484 to fulfill the co-curricular, service learning and capstone component of the certificate. Students are encouraged to build the coursework into their degree plans as much as possible through careful planning. Information on the program is available from the Associate Dean for Academic Affairs, Room 202 Eller O&M Building and departmental academic advisors.

Department of Atmospheric Sciences

Students in the Department of Atmospheric Sciences enjoy low student-to-teacher ratios and small classes. Undergraduates have opportunities for individual study and for participation in faculty research projects, including regional, national and international field programs.

Faculty

Bowman, Kenneth P, Professor
Atmospheric Sciences
PhD, Princeton University, 1984

Brooks, Sarah D, Associate Professor
Atmospheric Sciences
PhD, University of Colorado, 2002

Collins, Donald R, Professor
Atmospheric Sciences
PhD, California Institute of Technology, 2000

Conlee, Don T, Instructional Professor
Atmospheric Sciences
PhD, Texas A&M University, 1994

Dessler, Andrew E, Professor
Atmospheric Sciences
PhD, Harvard University, 1994

Epifanio, Craig C, Associate Professor
Atmospheric Sciences
PhD, University of Washington, 1999

Korty, Robert L, Associate Professor
Atmospheric Sciences
PhD, Massachusetts Institute of Technology, 2005

Lemmon, Mark T, Associate Professor
Atmospheric Sciences
PhD, University of Arizona, 1994

Logan, Timothy S, Lecturer
Atmospheric Sciences
PhD, University of North Dakota, 2014

Nasiri, Shaima L, Associate Professor
Atmospheric Sciences
PhD, University of Wisconsin-Madison, 2004

Nielsen-Gammon, John W, Professor
Atmospheric Sciences
PhD, Massachusetts Institute of Technology, 1990

North, Jerry R, Distinguished Professor
Atmospheric Sciences
PhD, University of Wisconsin, 1966

Nowotarski, Christopher J, Assistant Professor
Atmospheric Sciences
PhD, Pennsylvania State University, 2013

Orville, Richard E, Research Professor
Atmospheric Sciences
PhD, University Arizona, 1966

Panetta, Richard L, Professor
Atmospheric Sciences
PhD, University of Wisconsin, 1978

Rapp, Anita D, Assistant Professor
Atmospheric Sciences
PhD, Colorado State University, 2008

Saravanan, Ramalingam, Professor
Atmospheric Sciences
PhD, Princeton University, 1990

Schade, Gunnar W, Associate Professor
Atmospheric Sciences
PhD, Johannes Gutenberg Universitat, Germany, 1997

Schumacher, Courtney, Professor
Atmospheric Sciences
PhD, University of Washington, 2003

Szunyogh, Istvan, Professor
Atmospheric Sciences
PhD, Hungarian Academy of Sciences, 1994

Wilheit, Thomas T, Research Professor
Atmospheric Sciences
PhD, Massachusetts Institute of Technology, 1963

Winkley, Shel D, Visiting Lecturer
Atmospheric Sciences
BS, Texas A&M University, 2007
Yang, Ping, Professor
Atmospheric Sciences
PhD, University of Utah, 1995

Zhang, Renyi, Professor
Atmospheric Sciences
PhD, Massachusetts Institute of Technology, 1994

Majors

- Bachelor of Science in Meteorology (p. 372)
- Bachelor of Science in Meteorology and MS in Oceanography, 5-Year Degree Program (p. 373)

Minors

- Meteorology Minor (p. 373)

Facilities

The Department of Atmospheric Sciences occupies the upper floors of the 15-story Oceanography and Meteorology Building. The Doppler weather radar on the roof of the building is a campus landmark and is used for both research and teaching. The department also operates a mobile Doppler radar for use in research projects. The department has four state-of-the-art chemistry labs, in which phenomena from ozone to aerosols are studied, as well as facilities for modeling the chemical environment. A continuous, comprehensive stream of meteorological data is received from ground stations, balloons, aircraft, radars, and satellites around the world. Two well-equipped computer labs are regularly upgraded to provide state-of-the-art educational equipment.

Meteorology - BS

The Department of Atmospheric Sciences offers the Bachelor of Science degree in Meteorology. The undergraduate curriculum in meteorology emphasizes weather and weather forecasting, but also includes courses in climatology, atmospheric chemistry, cloud physics and remote sensing of the atmosphere with radar and satellites. As the curriculum makes clear, the study of these subjects relies on a foundation of physics, chemistry and mathematics. The atmospheric sciences also have close connections to oceanography and hydrology.

Students who receive BS degrees in Meteorology often obtain employment with the National Weather Service, private meteorological consulting and weather forecasting companies, air quality consulting firms, airlines, TV stations, energy trading companies, universities, state governments, agricultural firms and computer-related industries. Some students choose to enter the military services as weather officers. Positions in teaching and research normally require a graduate degree.

Students interested in cooperative educational arrangements and internships should contact the department’s academic advisor for information.

In the curriculum presented, students are advised to note carefully the prerequisites for many of the courses.

Program Requirements

First Year
Fall

| ATMO 201 | Weather and Climate | 3 |
| CHEM 101 | Fundamentals of Chemistry I | 4 |
| & CHEM 111 | and Fundamentals of Chemistry Laboratory I | |
| ENGL 104 | Composition and Rhetoric | 3 |
| MATH 151 or MATH 171 | Engineering Mathematics I or Analytic Geometry and Calculus | 4 |

| Term Semester Credit Hours | 14 |

Spring

| ATMO 203 | Weather Forecasting Laboratory | 1 |
| CHEM 102 | Fundamentals of Chemistry II | 4 |
| & CHEM 112 | and Fundamentals of Chemistry Laboratory II | |
| MATH 152 or MATH 172 | Engineering Mathematics II or Calculus | 4 |
| PHYS 218 | Mechanics | 4 |
| American history or Government/political science elective (p. 23) | |

| Term Semester Credit Hours | 16 |

Second Year
Fall

| ATMO 251 | Weather Observation and Analysis | 3 |
| ATMO 321 or CSCE 206 | Computer Applications in the Atmospheric Sciences or Structured Programming in C | 3 |
| ATMO 363 | Introduction to Atmospheric Chemistry and Air Pollution | 3 |
| MATH 251 | Engineering Mathematics III | 3 |
| American history or Government/political science elective (p. 23) | 3 |

| Term Semester Credit Hours | 15 |

Spring

| ATMO 324 | Physical and Regional Climatology | 3 |
| MATH 308 | Differential Equations | 3 |
| PHYS 208 | Electricity and Optics | 4 |
| American history or Government/political science elective (p. 23) | 3 |

| General Elective | |

| Term Semester Credit Hours | 3 |

Third Year
Fall

| ATMO 335 | Atmospheric Thermodynamics | 3 |
| ATMO 336 | Atmospheric Dynamics | 4 |
| STAT 211 | Principles of Statistics | 3 |
| American history or Government/political science elective (p. 23) | 3 |
| Atmospheric sciences or tech. elective (p. 644) | 1 |

| Term Semester Credit Hours | 16 |

Spring

| ATMO 435 | Synoptic-Dynamic Meteorology | 3 |
| Atmospheric sciences or tech. electives (p. 644) | 6 |
| COMM 203 or COMM 205 | Public Speaking or Communication for Technical Professions | 3 |

| Term Semester Credit Hours | 14 |
Language, philosophy and culture elective (p. 21) 3

**Term Semester Credit Hours** 15

### Fourth Year

**Fall**
- ATMO 446 Physical Meteorology 3
- ATMO 441 or Satellite Meteorology and Remote Sensing 3
- ATMO 443 or Radar Meteorology 3
- Atmospheric sciences or tech. electives (p. 644) 3
- General elective 1, 4, 5 3
- Social and behavioral science elective (p. 23) 3

**Term Semester Credit Hours** 15

### Spring
- Atmospheric sciences or tech. electives (p. 644) 9
- Creative arts elective (p. 22) 3
- General elective 4, 5 3

**Term Semester Credit Hours** 15

Total Semester Credit Hours: 120

1. A grade of C or better is required.
2. All students enter as Lower Level Meteorology (METL) until completion of ATMO 335 and ATMO 336 and the associated prerequisite courses. Once students have completed these courses, their major will be changed to Upper Level Meteorology (METR), and they will be eligible to take upper-level electives. This change should occur following Fall of the junior year.
3. Select in consultation with faculty academic advisor.
4. General electives may not include CAEN 101-499; CAEX 101-499; DEVS 101-499; ENGL 103; KINE 198-199 (p. 849); MATH 102, MATH 131, MATH 141-142 (p. 860), MATH 150-152 (p. 860), MATH 171-172 (p. 860), MATH 221, MATH 251, MATH 253; PHYS 101, PHYS 201-202 (p. 934), PHYS 208, PHYS 218-219 (p. 934); AERS 100-499 (p. 600); MLSC 100-499 (p. 889); NVSC 100-499 (p. 914); SOMS 100-499 (p. 982).
5. MLSC, NVSC and AERS courses can be used as general electives if a minor is completed in Military Science. See an academic advisor for more information.

**Meteorology - Minor**

Students of other disciplines, such as chemistry or mathematics, may complete a minor in meteorology by taking a minimum of 16 hours in Atmospheric Sciences or upper division geosciences. GEOS courses may comprise no more than 6 of these hours, with the remainder being ATMO. At least 9 of the 16 hours must be in courses 300-level or above, including at least three 400-level hours. The selection of courses must be made in agreement with an advisor from the Atmospheric Sciences faculty.

### Program Requirements

**300-level requirement**
Select from the following: 6
- ATMO 300-ATMO 399 (p. 644)
- GEOS 300-ATMO 399 (p. 808)

**400-level requirement**
Select from the following: 3
- ATMO 400-ATMO 499 (p. 644)

- GEOS 400-ATMO 499 (p. 808)

**Electives**
Select from the following: 7
- ATMO 100-ATMO 499 (p. 644)
- GEOS 300-ATMO 499 (p. 808)

**Total Semester Credit Hours** 16

Must maintain a minimum GPR of 2.000 in order to pursue this minor.

At least 9 hours of ATMO courses are required and a minimum of 3 hours at the 400 level.

**Meteorology - 5-Year Bachelor of Science/Master of Science in Oceanography**

The Fast Track Program offers motivated and exceptional students the opportunity to achieve aspirations in an efficient program at Texas A&M, completing the Bachelor of Science degree in the Department of Atmospheric Sciences Meteorology Program and the Oceanography non-thesis M.S. degree in 5 years. There will be only two courses used for dual credit in this program. There is a total of 150 hours of coursework. The concurrent degree program will enable these motivated students to coordinate the required B.S. coursework (114 undergraduate credit hours plus 6 dual credit graduate courses) and non-thesis M.S. coursework (36 credit hours including the 6 dual credit graduate courses) to complete the required credit hours for each degree without diminishing scope or quality of work and within 5 years.

### Application and Eligibility

- Applications to the Fast Track program will be submitted by July 1 after the completion of the student’s junior year. Applications submitted after that time will be evaluated on a case by case basis.
- Applicants must have a minimum undergraduate GPR of 3.0. Applicants must also earn a C or better in all Chemistry, Calculus and Physics courses. Once admitted to the program, students must maintain a minimum 3.0 GPR.
- A faculty advisor will be assigned to each student. Students may seek additional mentors, but a formal committee is not required.
- Students admitted into the Fast Track program must finish the entire 150 credit hours to obtain both the Bachelor’s and Master’s degrees. These students will be conferred with two degrees once they complete the 5th year of the concurrent program.
- Students admitted to the program will change from U4 to G7 status when they are admitted having completed at least 99 hours (end of spring semester, year 3).
- Students not accepted or not allowed to continue with the Fast Track Program will complete the 120 hour Bachelor’s degree under the standard 4 year curriculum. These students may still apply to the traditional graduate program.

* Students will graduate at the completion of the 5th year in the Fast Track Program coursework (150 credit hours) with both Bachelor’s and
Master’s degrees. Students will complete the coursework in May of the 5th year.

Program Requirements

First Year

Fall

<table>
<thead>
<tr>
<th>Semester Credit Hours</th>
<th>ATMO 201</th>
<th>Weather and Climate</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>&amp; CHEM 111</td>
<td>Fundamentals of Chemistry Laboratory I</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MATH 171</td>
<td>Analytic Geometry and Calculus</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>GEOS 101</td>
<td>Introduction to the Geosciences</td>
<td>1</td>
</tr>
</tbody>
</table>

Spring

<table>
<thead>
<tr>
<th>Semester Credit Hours</th>
<th>ATMO 203</th>
<th>Weather Forecasting Laboratory</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CHEM 102 &amp; CHEM 112</td>
<td>Fundamentals of Chemistry II and Fundamentals of Chemistry Laboratory II</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>MATH 172</td>
<td>Calculus</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>PHYS 218</td>
<td>Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>American history elective (p. 23)</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Second Year

Fall

<table>
<thead>
<tr>
<th>Semester Credit Hours</th>
<th>ATMO 251</th>
<th>Weather Observation and Analysis</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ATMO 363</td>
<td>Introduction to Atmospheric Chemistry and Air Pollution</td>
<td>3</td>
</tr>
<tr>
<td>MATH 251</td>
<td>Engineering Mathematics III</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ATMO 321</td>
<td>Computer Applications in the Atmospheric Sciences</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General elective 1</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Spring

<table>
<thead>
<tr>
<th>Semester Credit Hours</th>
<th>ATMO 335</th>
<th>Atmospheric Thermodynamics</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ATMO 336</td>
<td>Atmospheric Dynamics</td>
<td>4</td>
</tr>
<tr>
<td>STAT 211</td>
<td>Principles of Statistics</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>General Elective 1,8,9</td>
<td>3</td>
<td></td>
<td></td>
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</table>

Fourth Year

Fall

<table>
<thead>
<tr>
<th>Semester Credit Hours</th>
<th>ATMO 446</th>
<th>Physical Meteorology</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ATMO Inst/Remote Sensing elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ATMO or technical elective</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OCNG 604</td>
<td>Ocean Observing Systems</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>OCNG 608</td>
<td>Physical Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>OCNG 620</td>
<td>Biological Oceanography</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OCNG 630</td>
<td>Geological Oceanography</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OCNG 640</td>
<td>Chemical Oceanography</td>
<td></td>
</tr>
</tbody>
</table>

Spring

| Semester Credit Hours | ATMO or technical elective | 3 |
|-----------------------| OCNG 657 | Data Methods and Graphical Representation in Oceanography | 3 |
|                       | Representations in Oceanography | 4 |
| Select one of the following: | 3 |
|                       | OCNG 620 | Biological Oceanography |  |
|                       | OCNG 640 | Chemical Oceanography |  |
|                       | OCNG 630 | Geological Oceanography |  |
|                       | OCNG 603 | Communicating Ocean Science | 3 |

Fifth Year

Fall

| Semester Credit Hours | Advanced specialized OCNG graduate course | 9 |

Spring

| Semester Credit Hours | Advanced specialized OCNG graduate course | 6 |
|-----------------------| Capstone Experience II | 3 |

Total Semester Credit Hours: 135

Third Year

Fall

| Semester Credit Hours | Advanced specialized OCNG graduate course | 9 |

Spring

| Semester Credit Hours | Advanced specialized OCNG graduate course | 6 |
|-----------------------| Capstone Experience II | 3 |

Total Semester Credit Hours: 18
Any of the required courses may be taken during the Summer Sessions to diminish the heavy semester loads during Years Two and Three.

If students use nine credits of allowed OCNG courses (e.g. OCNG 251 or OCNG 401, OCNG 252, OCNG 350, OCNG 451, OCNG 485) as technical electives and general electives, they will receive an OCNG minor with their BS in METR degree.

Graduate courses will be taken for dual undergraduate/graduate credit and will contribute to the minor.

Students will not be permitted to receive credit for both the 400- and 600-level versions of certain courses because the content and learning outcomes are too similar (e.g. OCNG 440/OCNG 640; GEOS 470/OCNG 657).

A grade of C or better is required.

All students enter as Lower Level Meteorology (METL) until completion of ATMO 335 and ATMO 336 and the associated prerequisite courses. Once students have completed these courses, their major will be changed to Upper Level Meteorology (METR), and they will be eligible to take upper-level electives. This change should occur following Fall of the junior year.

Select in consultation with faculty academic advisor.

General electives may not include CAEN 101-499; CAEX 101-499; DEVS 101-499; ENGL 103; KINE 198-199 (p. 849); MATH 102, MATH 131, MATH 141-142 (p. 860), MATH 150-152 (p. 860), MATH 171-172 (p. 860), MATH 221, MATH 251, MATH 253; PHYS 101, PHYS 201-202 (p. 934), PHYS 208, PHYS 218-219 (p. 934); AERS 100-499 (p. 600); MLSC 100-499 (p. 889); NVSC 100-499 (p. 914); SOMS 100-499 (p. 982)

MLSC, NVSC and AERS courses can be used as general electives if a minor is completed in Military Science. See an academic advisor for more information.

Total undergraduate credit hours: 120

Total graduate credit hours: 36 (36 credits required for non-thesis MOST)

Total credits actually taken: 150

Department of Geography

Geography is the study of the relationships between people and their environments, relationships that vary from place to place over the Earth. Students inquire into those factors responsible for the variable and changing character of Earth's surface, which over time has been transformed into the human habitat. Geography integrates physical science, social science and the humanities. The Department requires that students understand both physical and human systems and develop the spatial analytical skills to do so.

Physical geography emphasizes a systematic and interdisciplinary approach to the study of landforms, climate, soils and vegetation. Human geography seeks to describe and explain the spatial patterns of human activities on Earth. These range from such economic activities as the distribution of retail sales and industrial production to cultural landscapes, which often have strong historic roots. Both physical and human geography use a set of analytic techniques that includes cartography, Geographic Information Science (GiSci), quantitative methods and remote sensing.

Faculty

Bednarz, Robert S, Professor
Geography
PhD, University of Chicago, 1974

Bednarz, Sarah W, Professor
Geography
PhD, Texas A&M University, 1992

Bishop, Michael P, Professor
Geography
PhD, Indiana State University, 1987

Brannstrom, Christian, Professor
Geography
PhD, University of Wisconsin-Madison, 1998

Cairns, David M, Professor
Geography
PhD, University of Iowa, 1995

Ewers, Michael C, Assistant Professor
Geography
PhD, Ohio State University, 2010

Filippi, Anthony M, Associate Professor
Geography
PhD, University of South Carolina, 2003

Frauenfeld, Oliver W, Assistant Professor
Geography
PhD, University of Virginia, 2003

Gaddis, Keith D, Visiting Assistant Professor
Geography
PhD, University of California, Los Angeles, 2014

Goldberg, Daniel W, Assistant Professor
Geography
PhD, University of Southern California, 2010

Guneralp, Burak, Research Assistant Professor
Geography
PhD, University of Illinois at Urbana-Champaign, 2006

Guneralp, Inci, Associate Professor
Geography
PhD, University of Illinois at Urbana-Champaign, 2007

Houser, Christopher A, Associate Professor
Geography
PhD, University of Toronto, 2004

Hugill, Peter J, Professor
Geography
PhD, Syracuse University, 1977

Jepson, Wendy E, Associate Professor
Geography
PhD, University of California, Los Angeles, 2003

Klein, Andrew G, Professor
Geography
PhD, Cornell University, 1997
Lafon, Charles W, Professor
Geography
PhD, University of Tennessee, 2000

O'Reilly, Kathleen M, Associate Professor
Geography
PhD, University of Iowa, 2002

Patzewitsch, Wendy W, Lecturer
Geography
PhD, Texas A&M University, 2007

Prout, Erik, Instructional Assistant Professor
Geography
PhD, Louisiana State University, 2001

Quiring, Steven M, Associate Professor
Geography
PhD, University of Delaware, 2005

Roark, Erin B, Associate Professor
Geography
PhD, University of California, Berkeley, 2005

Shinn, Jamie E., Assistant Professor
Geography
PhD, Pennsylvania State University, 2015

Smith, Jonathan, Professor
Geography
PhD, Syracuse University, 1991

Tchakerian, Vatche P, Professor
Geography
PhD, University of California, Los Angeles, 1989

Walenta, Jayme M, Visiting Assistant Professor
Geography
PhD, University of British Columbia, 2010

• Geography Minor (p. 392)
• Geographic Information Science and Technology (GIST) Minor (p. 392)

Geographic Information Science and Technology - BS, Computation, Design and Analysis Track

The BS in Geographic Information Science and Technology (GIST) requires semester credit hours for completion in the Computation, Design and Analysis (CDA), Earth Systems Analysis (ESA) or the Human Systems and Society (HSS) tracks.

The Computation, Design and Analysis (CDA) track will attract students interested in the computational, analysis and software development aspects of GIST. This track is more computational and information technology centered and focuses on addressing technical issues, algorithm development and performance, and software tool development.

Students will receive a rigorous and modern-day education and training in GIST with application knowledge in physical and human geography. Employers require problem solvers, not button pushers, to address problems in various application domains. The BS in GIST is designed to:

• Provide modern-day exposure to the rapidly changing field of GIST
• Balance education and training with a focus on competency
• Provide application and problem-solving experiences
• Support student activities and research
• Provide students with professional experience
• Produce high-quality geographers with strong GIST knowledge and skills

Geospatial technology graduates are in extremely high demand and according to the US Department of Labor (USDL), one of the highest growth areas in the federal government, particularly in homeland security activities, as well as in energy, software and engineering firms, and biomedical and biohazard research, among many others. A 35% annual rate of growth in Geospatial Technology related degrees are projected by the United States Department of Labor. Specifically, students have employment opportunities with the following corporate and government entities:

• Government agencies (federal, state, county and city): management and planning of urban infrastructure, inventory and assessment of natural resources including agriculture, forestry, and water resources.
• Energy industry: assessing biofuel production, and identifying locations suitable for renewable energy resources and mineral exploration.
• Health Science Industry: determine hotspots of health events and to explore for causative influences.
• Military and intelligence community: numerous opportunities exist in military branches, and agencies such as CIA, NAS and other intelligence organizations.
• Commercial industries: business analytics and marketing, as spatial information can be used to target marketing campaigns, and assess suitable sites to locate companies.
• Geospatial Industries: Software development, geotechnical engineering, and technology development.

Students select courses with the assistance of faculty advisors and academic advisor in an individualized advising system.

Program Requirements

First Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
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<td>GEOG 467 Dynamic Modeling of Earth and Environmental Systems</td>
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Geographic Information Science and Technology - BS, Earth Systems Analysis Track

The BS in Geographic Information Science and Technology (GIST) requires semester credit hours for completion in the Computation, Design and Analysis (CDA), Earth Systems Analysis (ESA) or the Human Systems and Society (HSS) tracks.

The Earth Systems Analysis (ESA) track will attract students interested in studying the Earth sciences and assessing the natural resources of the Earth through a foundation in biogeography, climate, geomorphology, soil science, geology and ecosystem science.

Students will receive a rigorous and modern-day education and training in GIST with application knowledge in physical and human geography. Employers require problem solvers, not button pushers, to address problems in various application domains. The BS in GIST is designed to:

- Produce high-quality geographers with strong GIST knowledge and skills

Geospatial technology graduates are in extremely high demand and according to the US Department of Labor (USDL), one of the highest growth areas in the federal government, particularly in homeland security activities, as well as in energy, software and engineering firms, and biomedical and biohazard research, among many others. A 35% annual rate of growth in Geospatial Technology related degrees are projected by the United States Department of Labor. Specifically, students have employment opportunities with the following corporate and government entities:

- Government agencies (federal, state, county and city): management and planning of urban infrastructure, inventory and assessment of natural resources including agriculture, forestry, and water resources.
- Energy industry: assessing biofuel production, and identifying locations suitable for renewable energy resources and mineral exploration.
- Health Science Industry: determine hotspots of health events and to explore for causative influences.
- Military and intelligence community: numerous opportunities exist in military branches, and agencies such as CIA, NAS and other intelligence organizations.
- Commercial industries: business analytics and marketing, as spatial information can be used to target marketing campaigns, and assess suitable sites to locate companies.
- Geospatial Industries: Software development, geotechnical engineering, and technology development.

Students select courses with the assistance of faculty advisors and academic advisor in an individualized advising system.

Program Requirements

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<th>First Year</th>
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**Term Semester Credit Hours** 16

**Second Year**

**Fall**

GEOG 232 Cartography and Visualization 3

POLS 207 State and Local Government 3

American history (p. 23) 3

Creative arts (p. 22) 3

Social and behavioral sciences (p. 23) 3

**Term Semester Credit Hours** 15

**Spring**

Select one of the following: 3

- GEOG 324 Global Climatic Regions
- GEOG 331 Geomorphology
- GEOG 335 Pattern and Process in Biogeography
- GEOG 352/GEOL GNSS in the Geosciences 352
- STAT 303 Statistical Methods 3
- American history (p. 23) 3
- Language, philosophy and culture (p. 21) 3

**Third Year**

**Fall**

Select one of the following: 3

- GEOG 304 Economic Geography
- GEOG 306 Introduction to Urban Geography
- GEOG 311 Cultural Geography

Select one of the following: 3

- GEOG 324 Global Climatic Regions
- GEOG 331 Geomorphology
- GEOG 335 Pattern and Process in Biogeography
- GEOG 361 Remote Sensing in Geosciences 4
- GEOG 390 Principles of Geographic Information Systems 4

**Term Semester Credit Hours** 15

**Spring**

ESSM 459 Spatial Databases and Programming 3

GEOG 312 Data Analysis in Geography 3

GEOG 475 Advanced Topics in GIS (Geographic Information Systems) 4

Direct elective 3

Select one of the following:

- BESC 201 Introduction to Bioenvironmental Sciences
- BESC 367 U.S. Environmental Regulations
- BESC 403 Sampling and Environmental Monitoring
- ESSM 305 Watershed Analysis and Planning
- ESSM 308 Fundamentals of Environmental Decision-Making
- ESSM 309 Forest Ecology
- ESSM 351 Geographic Information Systems for Resource Management
- ESSM 406 Natural Resources Policy
- ESSM 416 Fire Ecology and Natural Resource Management
- ESSM 440 Wetland Delineation
- ESSM 464 Spatial Project Management
- GEOL 104 Physical Geology
- GEOL 306 Sedimentology and Stratigraphy
- GEOL 410 Hydrogeology
- RENR 205 Fundamentals of Ecology
- RENR 470 Environmental Impact Assessment
- STAT 211 Principles of Statistics I
- STAT 212 Principles of Statistics II

**Fourth Year**

**Fall**

GEOG 477 Terrain Analysis and Mapping 4

Directed elective 3

Select two of the following:

- BESC 201 Introduction to Bioenvironmental Sciences
- BESC 367 U.S. Environmental Regulations
- BESC 403 Sampling and Environmental Monitoring
- ESSM 305 Watershed Analysis and Planning
- ESSM 308 Fundamentals of Environmental Decision-Making
- ESSM 309 Forest Ecology
- ESSM 351 Geographic Information Systems for Resource Management
- ESSM 406 Natural Resources Policy
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- GEOL 410 Hydrogeology
- RENR 205 Fundamentals of Ecology
- RENR 470 Environmental Impact Assessment
- STAT 211 Principles of Statistics I
- STAT 212 Principles of Statistics II

**Track elective** 2

Select 6 hours from the following:

- GEOG 205 Environmental Change
- GEOG 324 Global Climatic Regions
- GEOG 330 Resources and the Environment

**Term Semester Credit Hours** 14
### Geographic Information Science and Technology - BS, Human Systems and Society Track

The BS in Geographic Information Science and Technology (GIST) requires semester credit hours for completion in the Computation, Design and Analysis (CDA), Earth Systems Analysis (ESA) or the Human Systems and Society (HSS) tracks.

The Human Systems and Society (HSS) track will attract students interested in social sciences, human/environment relationships, and the planning and management of human resources and urban environments.

Students will receive a rigorous and modern-day education and training in GIST with application knowledge in physical and human geography. Employers require problem solvers, not button pushers, to address problems in various application domains. The BS in GIST is designed to:

- Provide modern-day exposure to the rapidly changing field of GIST
- Balance education and training with a focus on competency
- Provide application and problem-solving experiences
- Support student activities and research
- Provide students with professional experience
- Produce high-quality geographers with strong GIST knowledge and skills

Geospatial technology graduates are in extremely high demand and according to the US Department of Labor (USDL), one of the highest growth areas in the federal government, particularly in homeland security activities, as well as in energy, software and engineering firms, and biomedical and biohazard research, among many others. A 35% annual rate of growth in Geospatial Technology related degrees are projected by the United States Department of Labor. Specifically, students have employment opportunities with the following corporate and government entities:

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- Energy industry: assessing biofuel production, and identifying locations suitable for renewable energy resources and mineral exploration.
- Health Science Industry: determine hotspots of health events and to explore for causative influences.
- Military and intelligence community: numerous opportunities exist in military branches, and agencies such as CIA, NAS and other intelligence organizations.
- Commercial industries: business analytics and marketing, as spatial information can be used to target marketing campaigns, and assess suitable sites to locate companies.
- Geospatial Industries: Software development, geotechnical engineering, and technology development.

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### Total Semester Credit Hours: 120

1. 8 hours required. Department requires that you take two in the same discipline to meet this requirement.
2. Track electives comprise 6 hours of focused coursework. The track and specific courses within the track are to be chosen in consultation with the advisor and/or faculty mentor.
3. 19 hours required. To be selected from the following or chosen in consultation with an advisor.
Students select courses with the assistance of faculty advisors and academic advisor in an individualized advising system.

## Program Requirements

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### Third Year

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<td>Introduction to Urban Geography</td>
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<td>Geography of Energy</td>
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<td>GEOG 330</td>
<td>Resources and the Environment</td>
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<td>GEOG 335</td>
<td>Pattern and Process in Biogeography</td>
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<td>GEOG 360</td>
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<td>GEOG 392</td>
<td>GIS Programming</td>
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<td>Interpretation of Aerial Photographs</td>
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<td>GEOG 404</td>
<td>Spatial Thinking, Perception and Behavior</td>
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<td>GEOG 406</td>
<td>Geographic Perspectives on Contemporary Urban Issues</td>
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<td>GEOG 430</td>
<td>Environmental Justice</td>
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<td>GEOG 461</td>
<td>Digital Image Processing in the Geosciences</td>
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<td>GEOG 477</td>
<td>Terrain Analysis and Mapping</td>
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<td>GEOG 478</td>
<td>WebGIS</td>
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<td>GEOG 479</td>
<td>Principles of Geocomputation</td>
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<td>ESSM 459</td>
<td>Spatial Databases and Programming</td>
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<td>GEOG 312</td>
<td>Data Analysis in Geography</td>
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<td>GEOG 475</td>
<td>Advanced Topics in GIS (Geographic Information Systems)</td>
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<tr>
<td>ESSM 305</td>
<td>Watershed Analysis and Planning</td>
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<td>ESSM 308</td>
<td>Fundamentals of Environmental Decision-Making</td>
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<td>RENR 375</td>
<td>Conservation of Natural Resources</td>
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<td>RENR 470</td>
<td>Environmental Impact Assessment</td>
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<td>STAT 211</td>
<td>Principles of Statistics I</td>
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<td>STAT 212</td>
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</table>
URPN 325 Introduction to GIS in Urban and Regional Planning
URPN 326 Advanced GIS in Urban and Regional Planning
URPN 369 Transportation and Urban Form
URPN 440 Urban and Regional Economic Development
URPN 460 Sustainable Communities

**Fourth Year**

**Term** | **Semester** | **Credit Hours**
--- | --- | ---

**Fall** | 14 | 
Select one of the following:
GEOG 304 Economic Geography
GEOG 306 Introduction to Urban Geography
GEOG 311 Cultural Geography
Select one of the following:
GEOG 398 Interpretation of Aerial Photographs
GEOG 477 Terrain Analysis and Mapping
GEOG 479 Principles of Geocomputation
Track elective 2
Select one of the following:
GEOG 304 Economic Geography 2
GEOG 306 Introduction to Urban Geography 2
GEOG 309 Geography of Energy 2
GEOG 311 Cultural Geography 2
GEOG 330 Resources and the Environment 2
GEOG 335 Pattern and Process in Biogeography 2
GEOG 360 Natural Hazards 2
GEOG 392 GIS Programming 2
GEOG 398 Interpretation of Aerial Photographs 2
GEOG 401 Political Geography 2
GEOG 404 Spatial Thinking, Perception and Behavior
GEOG 406 Geographic Perspectives on Contemporary Urban Issues
GEOG 430 Environmental Justice
GEOG 461 Digital Image Processing in the Geosciences
GEOG 477 Terrain Analysis and Mapping
GEOG 478 WebGIS 2
GEOG 479 Principles of Geocomputation
Directed elective 3
Select from the following:
ESSM 305 Watershed Analysis and Planning
ESSM 308 Fundamentals of Environmental Decision-Making
RENR 375 Conservation of Natural Resources
RENR 470 Environmental Impact Assessment
STAT 211 Principles of Statistics I
STAT 212 Principles of Statistics II
URPN 325 Introduction to GIS in Urban and Regional Planning
URPN 326 Advanced GIS in Urban and Regional Planning
URPN 369 Transportation and Urban Form
URPN 440 Urban and Regional Economic Development
URPN 460 Sustainable Communities

**Spring** | 16 | 
Select one of the following:
GEOG 398 Interpretation of Aerial Photographs
GEOG 477 Terrain Analysis and Mapping
GEOG 479 Principles of Geocomputation
GEOG 476 GIS Practicum 3
Directed elective 3
Select from the following:
ESSM 305 Watershed Analysis and Planning
ESSM 308 Fundamentals of Environmental Decision-Making
RENR 375 Conservation of Natural Resources
RENR 470 Environmental Impact Assessment
STAT 211 Principles of Statistics I
STAT 212 Principles of Statistics II
URPN 325 Introduction to GIS in Urban and Regional Planning
URPN 326 Advanced GIS in Urban and Regional Planning
URPN 369 Transportation and Urban Form
URPN 440 Urban and Regional Economic Development
URPN 460 Sustainable Communities

**Total Semester Credit Hours:** 120

1. 8 hours required. Department requires that you take two in the same discipline to meet this requirement.
2. Track electives comprise 6 hours of focused coursework. The track and specific courses within the track are to be chosen in consultation with the advisor and/or faculty mentor.
3. 19-20 hours required. To be selected from the following or chosen in consultation with Advisor.

Two courses in the degree plan must be Writing Intensive courses designated by the department in the schedule of classes. Also, International and Cultural Diversity Electives (6 hours) must be incorporated into the degree.

**Geography - BS**

A student seeking a Bachelor of Science degree in Geography is expected to complete a minimum curriculum of 56 hours in geography, while 18 of those hours will be chosen from one of the following selected tracks of focus: Human Geography, Geography of the Natural Environment, Human-Environment Interactions, or Geography. The Department of Geography also administers the Bachelor of Science degree program in
Environmental Studies for the College of Geosciences. Students must pass two Writing-Intensive courses within their major. This includes any geography course with a 9xx section number. Geography courses may include field trips outside scheduled class hours. Students are required to defray some or all of the expenses incurred on such trips.

Graduates with the BS degree may be able to qualify for a variety of jobs using their analytic skills in locational and environmental analysis for business or industry, or for a variety of positions in local, state or federal agencies. Advanced degrees provide greater opportunities.

For students interested in a career in education, the Department of Geography works closely with the Department of Teaching, Learning and Culture. Geography is part of a Social Studies composite degree program that prepares students to teach at middle and high school levels.

**Program Requirements**

**First Year**

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<th>Semester</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Hours</th>
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<td>GEOG 201</td>
<td>Introduction to Human Geography</td>
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<td>Communication elective (p. 20)</td>
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<td>BIOL 101</td>
<td>Botany</td>
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<td>BIOL 111</td>
<td>Introductory Biology I</td>
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<td>GEOG 202</td>
<td>Geography of the Global Village</td>
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<td>Planet Earth Lab</td>
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**Second Year**

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<td>POLS 206</td>
<td>American National Government</td>
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<td>STAT 303</td>
<td>Statistical Methods</td>
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**Third Year**

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<td>Geography of the United States</td>
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<td>GEOG 305</td>
<td>Geography of Texas</td>
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<td>GEOG 320</td>
<td>The Middle East</td>
<td>3</td>
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<td>GEOG 323</td>
<td>Geography of Latin America</td>
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<td>GEOG 325</td>
<td>Geography of Europe</td>
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<td>GEOG 327</td>
<td>Geography of South Asia</td>
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<td>Geography of Texas</td>
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<td>The Middle East</td>
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<td>GEOG 323</td>
<td>Geography of Latin America</td>
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### Track Electives

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<td>GEOG 304, Economic Geography</td>
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<td>GEOG 305, Geography of Texas</td>
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<td>GEOG 306, Introduction to Urban Geography</td>
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<td>GEOG 309, Geography of Energy</td>
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<td>GEOG 311, Cultural Geography</td>
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<td>GEOG 312, Data Analysis in Geography</td>
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<td>GEOG 320, The Middle East</td>
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<tr>
<td>GEOG 323, Geography of Latin America</td>
<td>3</td>
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<td>GEOG 324, Global Climatic Regions</td>
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<td>GEOG 325, Geography of Europe</td>
<td>3</td>
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<tr>
<td>GEOG 327, Geography of South Asia</td>
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</tr>
<tr>
<td>GEOG 330, Resources and the Environment</td>
<td>3</td>
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<tr>
<td>GEOG 331, Geomorphology</td>
<td>3</td>
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<tr>
<td>GEOG 335, Pattern and Process in Biogeography</td>
<td>3</td>
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<tr>
<td>GEOG 355, Concepts in Geographic Education</td>
<td>3</td>
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<td>GEOG 360, Natural Hazards</td>
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<td>GEOG 361, Remote Sensing in Geosciences</td>
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<td>GEOG 370/MARS 370, Coastal Processes</td>
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<td>GEOG 380, Workshop in Environmental Studies</td>
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<td>GEOG 398, Interpretation of Aerial Photographs</td>
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<td>GEOG 400, Arid Lands Geomorphology</td>
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<td>GEOG 401, Political Geography</td>
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<td>GEOG 404, Spatial Thinking, Perception and Behavior</td>
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<td>GEOG 405, Field Trips</td>
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<td>GEOG 406, Geographic Perspectives on Contemporary Urban Issues</td>
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<td>GEOG 420, Geography of Terrorism</td>
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<td>GEOG 430, Environmental Justice</td>
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<td>GEOG 434, Hydrology and Environment</td>
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<td>GEOG 435, Principles of Plant Geography</td>
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<td>GEOG 442, Past Climates</td>
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<td>GEOG 462, Advanced GIS Analysis for Natural Resources</td>
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<td>ESSM 462, Management</td>
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<td>GEOG 467, Dynamic Modeling of Earth and Environmental Systems</td>
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<td>GEOG 475, Advanced Topics in GIS (Geographic Information Systems)</td>
<td>4</td>
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<tr>
<td>GEOG 476, GIS Practicum</td>
<td>3</td>
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</tbody>
</table>

1. 8 hours required. Department requires that you take two in the same discipline to meet this requirement.
2. Courses to be approved by advisor.
3. Track electives comprise 18 hours of focused coursework beyond the Geography core. The track and the specific courses within the track are to be chosen in consultation with the academic advisor from the list below.
4. At most, one of these courses may be chosen from GEOG 301, GEOG 305.

---

**Geography - BS, Human Geography Track**

A student seeking a Bachelor of Science degree in Geography is expected to complete a minimum curriculum of 56 hours in geography, while 18 of those hours will be chosen from one of the following selected tracks of focus: Human Geography, Geography of the Natural Environment, Human-Environment Interactions, or Geography. The Department of Geography also administers the Bachelor of Science degree program in Environmental Studies for the College of Geosciences. Students must pass two Writing-Intensive courses within their major. This includes any geography course with a 9xx section number. Geography courses may include field trips outside scheduled class hours. Students are required to defray some or all of the expenses incurred on such trips.

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### Program Requirements

#### First Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tr>
<td>GEOG 201, Introduction to Human Geography</td>
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<td>American history (p. 23)</td>
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<td>Communication (p. 20)</td>
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<td>Life and physical sciences elective</td>
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Select one of the following:
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<th>Course</th>
<th>Term</th>
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<tr>
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<td>GEOG 320 The Middle East</td>
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<td>GEOG 323 Geography of Latin America</td>
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GEOG 312 Data Analysis in Geography
GEOG 320 The Middle East
GEOG 323 Geography of Latin America
GEOG 325 Geography of Europe
GEOG 327 Geography of South Asia
GEOG 401 Political Geography
GEOG 404 Spatial Thinking, Perception and Behavior
GEOG 406 Geographic Perspectives on Contemporary Urban Issues
GEOG 420 Geography of Terrorism
GEOG 430 Environmental Justice
Elective

Term Semester Credit Hours 16

Spring
GEOG 440 History and Nature of Geography 3
Problem Solving and Professionalization 3
Select one of the following:
  GEOG 355 Concepts in Geographic Education
  GEOG 380 Workshop in Environmental Studies
  GEOG 476 GIS Practicum
  GEOG 484 Internship
  GEOG 491 Research
Human Geography Track Elective

Select one of the following:
  GEOG 309 Geography of Energy
  GEOG 312 Data Analysis in Geography
  GEOG 320 The Middle East
  GEOG 323 Geography of Latin America
  GEOG 325 Geography of Europe
  GEOG 327 Geography of South Asia
  GEOG 401 Political Geography
  GEOG 404 Spatial Thinking, Perception and Behavior
  GEOG 406 Geographic Perspectives on Contemporary Urban Issues
  GEOG 420 Geography of Terrorism
  GEOG 430 Environmental Justice
Electives 2

Term Semester Credit Hours 15
Total Semester Credit Hours: 120

1 8 hours required. Department requires that you take two in the same discipline to meet this requirement.
2 Courses to be approved by advisor.
3 Track electives comprise 18 hours of focused coursework beyond the Geography core. The track and the specific courses within the track are to be chosen in consultation with the faculty advisor. At most, one of these may be regional geography course (GEOG 320, GEOG 323, GEOG 325, GEOG 327).
4 At most, one of these courses may be chosen from GEOG 301, GEOG 305.

International and Cultural Diversity Electives (6 hours) must be incorporated into the degree.

Geography - BS, Geography of the Natural Environment Track

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Program Requirements

First Year

Fall

GEOG 201 Introduction to Human Geography 3
American history (p. 23) 3
Communication (p. 20) 3
Life and physical sciences elective 1

Select one of the following:
  BIOL 101 Botany
  BIOL 111 Introductory Biology I
  CHEM 101 & CHEM 111 Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory I
  GEOL 101 Principles of Geology
  PHYS 201 College Physics

Electives 2

Term Semester Credit Hours 15
Total Semester Credit Hours: 120

Spring

GEOG 202 Geography of the Global Village 3
GEOG 203 Planet Earth 3
GEOG 213 Planet Earth Lab 1
MATH 141 Business Mathematics I 3
Life and physical sciences elective: 1

Select one of the following:
  BIOL 107 Zoology
  BIOL 112 Introductory Biology II
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**Geography - BS, Human-Environment Interactions Track**

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### Program Requirements

#### First Year

**Fall**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIOL 101</td>
<td>Botany</td>
</tr>
<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
</tr>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
</tr>
<tr>
<td>&amp; CHEM 111</td>
<td>Fundamentals of Chemistry Laboratory I</td>
</tr>
<tr>
<td>GEOL 101</td>
<td>Principles of Geology</td>
</tr>
<tr>
<td>PHYS 201</td>
<td>College Physics</td>
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**Spring**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term Semester Credit Hours</th>
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<tbody>
<tr>
<td>GEOG 202</td>
<td>Geography of the Global Village</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 203</td>
<td>Planet Earth</td>
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</tr>
<tr>
<td>GEOG 213</td>
<td>Planet Earth Lab</td>
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<tr>
<td>MATH 141</td>
<td>Business Mathematics I</td>
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<tr>
<td>Life and physical sciences elective (^1)</td>
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Select one of the following:

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<tr>
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<th>Course Title</th>
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<tbody>
<tr>
<td>BIOL 107</td>
<td>Zoology</td>
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<tr>
<td>BIOL 112</td>
<td>Introductory Biology II</td>
</tr>
<tr>
<td>CHEM 102</td>
<td>Fundamentals of Chemistry II</td>
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<tr>
<td>&amp; CHEM 112</td>
<td>Fundamentals of Chemistry Laboratory II</td>
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<tr>
<td>GEOL 106</td>
<td>Historical Geology</td>
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<td>PHYS 202</td>
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**Second Year**

**Fall**

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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>GEOG 232</td>
<td>Cartography and Visualization</td>
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<td>MATH 142</td>
<td>Business Mathematics II</td>
<td>3</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
</tr>
<tr>
<td>Human Geography</td>
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Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>GEOG 304</td>
<td>Economic Geography</td>
</tr>
<tr>
<td>GEOG 306</td>
<td>Introduction to Urban Geography</td>
</tr>
<tr>
<td>GEOG 311</td>
<td>Cultural Geography</td>
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<td>Elective (^2)</td>
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**Spring**

<table>
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<tr>
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<tbody>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
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<tr>
<td>Creative arts (p. 22)</td>
<td></td>
<td>3</td>
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<tr>
<td>Physical Geography</td>
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<td>3</td>
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Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>GEOG 324</td>
<td>Global Climatic Regions</td>
</tr>
<tr>
<td>GEOG 331</td>
<td>Geomorphology</td>
</tr>
<tr>
<td>GEOG 335</td>
<td>Pattern and Process in Biogeography</td>
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**Human-Environment Interactions Track**

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>GEOG 330</td>
<td>Resources and the Environment</td>
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**Electives**

<table>
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<th>Course Title</th>
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<tr>
<td></td>
<td>Statistical Methods</td>
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<td></td>
<td>American history (p. 23)</td>
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<tr>
<td></td>
<td>Regional Geography</td>
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Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>GEOG 301</td>
<td>Geography of the United States</td>
</tr>
<tr>
<td>GEOG 305</td>
<td>Geography of Texas</td>
</tr>
<tr>
<td>GEOG 320</td>
<td>The Middle East</td>
</tr>
<tr>
<td>GEOG 323</td>
<td>Geography of Latin America</td>
</tr>
<tr>
<td>GEOG 325</td>
<td>Geography of Europe</td>
</tr>
<tr>
<td>GEOG 327</td>
<td>Geography of South Asia</td>
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**Human-Environment Interactions Track**

<table>
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<tr>
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<tr>
<td>GEOG 360</td>
<td>Natural Hazards</td>
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**Electives**

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<th>Course Title</th>
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<tbody>
<tr>
<td></td>
<td>Principles of Geographic Information Systems</td>
</tr>
<tr>
<td></td>
<td>Communication (p. 20)</td>
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Select one of the following:

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<td>History and Nature of Geography</td>
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<td>GEOG 312</td>
<td>Data Analysis in Geography</td>
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<tr>
<td>GEOG 401</td>
<td>Political Geography</td>
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<tr>
<td>GEOG 404</td>
<td>Spatial Thinking, Perception and Behavior</td>
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<tr>
<td>GEOG 430</td>
<td>Environmental Justice</td>
</tr>
<tr>
<td>GEOG 434</td>
<td>Hydrology and Environment</td>
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<tr>
<td>GEOG 467</td>
<td>Dynamic Modeling of Earth and Environmental Systems</td>
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**Electives**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td></td>
<td>Concepts in Geographic Education</td>
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<tr>
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<td>Workshop in Environmental Studies</td>
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<td>Internship</td>
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**Fourth Year**

**Fall**

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<td>GEOG 450</td>
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Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>GEOG 301</td>
<td>Geography of the United States</td>
</tr>
<tr>
<td>GEOG 305</td>
<td>Geography of Texas</td>
</tr>
<tr>
<td>GEOG 320</td>
<td>The Middle East</td>
</tr>
<tr>
<td>GEOG 323</td>
<td>Geography of Latin America</td>
</tr>
<tr>
<td>GEOG 325</td>
<td>Geography of Europe</td>
</tr>
<tr>
<td>GEOG 327</td>
<td>Geography of South Asia</td>
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**Human-Environment Interactions Track Electives**

Select two of the following:

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<td>Geography of Energy</td>
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<tr>
<td>GEOG 312</td>
<td>Data Analysis in Geography</td>
</tr>
<tr>
<td>GEOG 401</td>
<td>Political Geography</td>
</tr>
<tr>
<td>GEOG 404</td>
<td>Spatial Thinking, Perception and Behavior</td>
</tr>
<tr>
<td>GEOG 430</td>
<td>Environmental Justice</td>
</tr>
<tr>
<td>GEOG 434</td>
<td>Hydrology and Environment</td>
</tr>
<tr>
<td>GEOG 467</td>
<td>Dynamic Modeling of Earth and Environmental Systems</td>
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**Electives**

<table>
<thead>
<tr>
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<th>Course Title</th>
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<tbody>
<tr>
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<tr>
<td>GEOG 305</td>
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<tr>
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<tr>
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</tr>
<tr>
<td>GEOG 430</td>
<td>Environmental Justice</td>
</tr>
<tr>
<td>GEOG 434</td>
<td>Hydrology and Environment</td>
</tr>
<tr>
<td>GEOG 467</td>
<td>Dynamic Modeling of Earth and Environmental Systems</td>
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<tr>
<td>GEOG 491</td>
<td>Research</td>
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**Spring**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>GEOG 390</td>
<td>Principles of Geographic Information Systems</td>
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<td>Communication (p. 20)</td>
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Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>GEOG 355</td>
<td>Concepts in Geographic Education</td>
</tr>
<tr>
<td>GEOG 380</td>
<td>Workshop in Environmental Studies</td>
</tr>
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<td>GEOG 476</td>
<td>GIS Practicum</td>
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<td>GEOG 484</td>
<td>Internship</td>
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<tr>
<td>GEOG 491</td>
<td>Research</td>
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</table>

**Electives**

<table>
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<tr>
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<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>GEOG 309</td>
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<tr>
<td>GEOG 312</td>
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</tr>
<tr>
<td>GEOG 401</td>
<td>Political Geography</td>
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<tr>
<td>GEOG 404</td>
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<tr>
<td>GEOG 430</td>
<td>Environmental Justice</td>
</tr>
<tr>
<td>GEOG 434</td>
<td>Hydrology and Environment</td>
</tr>
<tr>
<td>GEOG 467</td>
<td>Dynamic Modeling of Earth and Environmental Systems</td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours:**

1 8 hours required. Department requires that you take two in the same discipline to meet this requirement.
2 Courses to be approved by advisor.
3 Track electives comprise 18 hours of focused coursework beyond the Geography core. The track and the specific courses within the track are to be chosen in consultation with the academic advisor.
4 At most, one of these courses may be chosen from GEOG 301, GEOG 305.
5 Two courses in the degree plan must be Writing Intensive courses designated by the department in the schedule of classes. Also, International and Cultural Diversity Electives (6 hours) must be incorporated into the degree.
University Studies - BS, Geographic Information Science and Technology Concentration

The broad objective of the academic discipline of geography is to understand and improve the human environment: Earth. Understanding the Earth's surface requires a consideration of both natural and social processes, hence geography is by nature interdisciplinary. Human-environment interactions are of particular interest in geography. The area of concentration in geography offers students a broad perspective on the Earth as human habitat, while permitting them to complete two supporting minors in other disciplines. The area of concentration is flexible in that numerous courses are included to permit a student to build a course of study in geography that is tailored to his or her interests. Ideally, the minors would be in related fields to build depth and breadth around themes that the student wishes to emphasize.

Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>GEOG 390</td>
<td>Principles of Geographic Information Systems</td>
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<tr>
<td>GEOG 361</td>
<td>Remote Sensing in Geosciences</td>
<td>4</td>
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<tr>
<td>GEOG 352/GEOL 352</td>
<td>GNSS in the Geosciences</td>
<td>3</td>
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<tr>
<td>GEOG 475</td>
<td>Advanced Topics in GIS (Geographic Information Systems)</td>
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<tr>
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<tr>
<td>ESSM 459</td>
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<tr>
<td>CSCE 111</td>
<td>Introduction to Computer Science Concepts and Programming</td>
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<tr>
<td>GEOG 232</td>
<td>Cartography and Visualization</td>
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<td>GEOG 398</td>
<td>Interpretation of Aerial Photographs</td>
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<tr>
<td>GEOG 392</td>
<td>GIS Programming</td>
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<tr>
<td>GEOG 461</td>
<td>Digital Image Processing in the Geosciences</td>
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</tr>
<tr>
<td>GEOG 475</td>
<td>Advanced Topics in GIS (Geographic Information Systems)</td>
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<tr>
<td>GEOG 312</td>
<td>Data Analysis in Geography</td>
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<td>GEOG 479</td>
<td>Principles of Geocomputation</td>
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<td>GEOG 461</td>
<td>Digital Image Processing in the Geosciences</td>
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<td>University and College Requirements</td>
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<td>MATH 141</td>
<td>Business Mathematics I</td>
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<td>MATH 142</td>
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<td>Language, Philosophy and Culture (p. 21)</td>
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<td>Creative Arts (p. 22)</td>
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<td>Social and Behavioral Sciences (p. 23)</td>
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<tr>
<td>American History (p. 23)</td>
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<tr>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
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<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
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<tr>
<td>International and Cultural Diversity (p. 34)</td>
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<tr>
<td>Minor 1</td>
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<td>Minor 2</td>
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<tr>
<td>Free Electives</td>
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<tr>
<td>Total Semester Credit Hours</td>
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<td></td>
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</tbody>
</table>

1 A graduation requirement includes 6 hours of international and cultural diversity courses. A course satisfying a University Core category, a college/department requirement, or a free elective may be used to satisfy this requirement.

University Studies - BS, Geography Concentration

The broad objective of the academic discipline of geography is to understand and improve the human environment: Earth. Understanding the Earth's surface requires a consideration of both natural and social processes, hence geography is by nature interdisciplinary. Human-environment interactions are of particular interest in geography. The area of concentration in geography offers students a broad perspective on the Earth as human habitat, while permitting them to complete two supporting minors in other disciplines. The area of concentration is flexible in that numerous courses are included to permit a student to build a course of study in geography that is tailored to his or her interests. Ideally, the minors would be in related fields to build depth and breadth around themes that the student wishes to emphasize.

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
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<tbody>
<tr>
<td>GEOG 201</td>
<td>Introduction to Human Geography</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 202</td>
<td>Geography of the Global Village</td>
<td>3</td>
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<tr>
<td>GEOG 203</td>
<td>Planet Earth</td>
<td>3</td>
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<tr>
<td>Select one of the following:</td>
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<tr>
<td>GEOG 304</td>
<td>Economic Geography</td>
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<tr>
<td>GEOG 306</td>
<td>Introduction to Urban Geography</td>
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</tr>
<tr>
<td>GEOG 309</td>
<td>Geography of Energy</td>
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<td>GEOG 311</td>
<td>Cultural Geography</td>
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<td>Data Analysis in Geography</td>
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<td>GEOG 331</td>
<td>Geomorphology</td>
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<td>GEOG 335</td>
<td>Pattern and Process in Biogeography</td>
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<td>GEOG</td>
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<td>370/MARS</td>
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<td>Concepts in Geographic Education</td>
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<td>GEOG</td>
<td>Coastal Processes</td>
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<td>Principles of Geographic Information Systems</td>
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<td>GEOG 398</td>
<td>Interpretation of Aerial Photographs</td>
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<td>Arid Lands Geomorphology</td>
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<td>GEOG 435</td>
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<td>GEOG 440</td>
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<td>GEOG 442</td>
<td>Past Climates</td>
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<td>GEOG 450</td>
<td>Field Geography</td>
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<tr>
<td>GEOG 467</td>
<td>Dynamic Modeling of Earth and Environmental</td>
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<td>Systems</td>
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<td>GEOG 475</td>
<td>Advanced Topics in GIS (Geographic Information</td>
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<td>GEOG 476</td>
<td>GIS Practicum</td>
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<td>GEOG 485</td>
<td>Directed Studies</td>
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<td>GEOG 489</td>
<td>Special Topics in...</td>
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<tr>
<td>GEOG 491</td>
<td>Research</td>
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</tbody>
</table>

Select two of the following: 6

- GEOG 400 Arid Lands Geomorphology
- GEOG 401 Political Geography
- GEOG 404 Spatial Thinking, Perception and Behavior
- GEOG 406 Geographic Perspectives on Contemporary Urban Issues
- GEOG 420 Geography of Terrorism
- GEOG 430 Environmental Justice
- GEOG 434 Hydrology and Environment
- GEOG 435 Principles of Plant Geography
- GEOG 440 History and Nature of Geography
- GEOG 442 Past Climates
- GEOG 450 Field Geography
- GEOG 467 Dynamic Modeling of Earth and Environmental Systems
- GEOG 475 Advanced Topics in GIS (Geographic Information Systems)
- GEOG 476 GIS Practicum
- GEOG 485 Directed Studies
- GEOG 489 Special Topics in...
- GEOG 491 Research

University and College Requirements

Communication elective (p. 20) 6

- MATH 141 Business Mathematics I 3
- MATH 142 Business Mathematics II 3
- GEOG 213 Planet Earth Lab 1

Life and Physical Science electives 8

Select one of the following:
<table>
<thead>
<tr>
<th>BIOL 101 &amp; BIOL 107</th>
<th>Botany and Zoology</th>
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</thead>
<tbody>
<tr>
<td>BIOL 111 &amp; BIOL 112</td>
<td>Introductory Biology I and Introductory Biology II</td>
</tr>
<tr>
<td>CHEM 101 &amp; CHEM 102 &amp; CHEM 102</td>
<td>Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory I and Fundamentals of Chemistry Laboratory II</td>
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<td>CHEM 111 &amp; CHEM 112</td>
<td>Fundamentals of Chemistry II</td>
</tr>
<tr>
<td>PHYS 201 &amp; PHYS 202</td>
<td>College Physics and College Physics</td>
</tr>
</tbody>
</table>

| Language, Philosophy and Culture elective (p. 21) | 3 |
| Creative Arts elective (p. 22) | 3 |
| Social and Behavioral Sciences elective (p. 23) | 3 |
| American History elective (p. 23) | 6 |
| POLS 206 | American National Government |
| POLS 207 | State and Local Government |
| Minor 1 | 15-18 |
| Minor 2 | 15-18 |

**General Electives**<sup>2</sup> 18-24

**Total Semester Credit Hours** 120

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1. GEOG 301 and GEOG 305 cannot be used in combination to meet this requirement.

2. Any 100-499 course not used elsewhere.

Two courses that meet the writing requirement are required.

A total of six semester credit hours must include courses that meet the International and Cultural Diversity (p. 34) requirements, except sections of BUSN 289 that meet the university writing requirement.

### Geographic Information Science and Technology (GIST) - Minor

Geographic Information Science and Technology (GIST) is used to solve problems associated with land administration, environment and natural resource management, planning and population studies, as well as traditional surveying and mapping applications. GIST uses GIS, remote sensing, and global positioning mapping to collect, analyze and display spatial information.

#### General Requirements

1. Geography Minor: minimum of 16 credits in the discipline with at least 6 hours in upper-division courses, 3 hours of which must be at the 400 level.

2. Geographic Information Science and Technology (GIST): minimum of 15 credits in the discipline at 300-400 level.

3. Minimum of 6 credits must be taken in residence at either Texas A&M University or Texas A&M at Galveston.

4. Students must meet with the department’s advisor for minor programs for approval of courses selected (any substitutions must be approved by the department head).

5. Minimum cumulative GPR of 2.0 must be achieved for all courses in the minor.

#### Program Requirements

<table>
<thead>
<tr>
<th>GEOG/GEOL</th>
<th>GNSS in the Geosciences</th>
<th>3</th>
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</thead>
<tbody>
<tr>
<td>GEOG 361</td>
<td>Remote Sensing in Geosciences</td>
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</tr>
<tr>
<td>GEOG 390</td>
<td>Principles of Geographic Information Systems</td>
<td>4</td>
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<tr>
<td>Select one of the following:</td>
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<tr>
<td>GEOG 392</td>
<td>GIS Programming</td>
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<tr>
<td>GEOG 461</td>
<td>Digital Image Processing in the Geosciences</td>
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<tr>
<td>GEOG 475</td>
<td>Advanced Topics in GIS (Geographic Information Systems)</td>
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<tr>
<td>GEOG 477</td>
<td>Terrain Analysis and Mapping</td>
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<tr>
<td>GEOG 478</td>
<td>WebGIS</td>
<td></td>
</tr>
<tr>
<td>GEOG 479</td>
<td>Principles of Geocomputation</td>
<td></td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours** 15

1. Fall semester course

2. Spring semester course

### Geography - Minor

#### General Requirements

1. Geography Minor: minimum of 16 credits in the discipline with at least 6 hours in upper-division courses, 3 hours of which must be at the 400 level.

2. Geographic Information Science and Technology (GIST): minimum of 15 credits in the discipline at 300-400 level.

3. Minimum of 6 credits must be taken in residence at either Texas A&M University or Texas A&M at Galveston.

4. Students must meet with the department’s advisor for minor programs for approval of courses selected (any substitutions must be approved by the department head).

5. Minimum cumulative GPR of 2.0 must be achieved for all courses in the minor.

#### Program Requirements

| GEOG 201 | Introduction to Human Geography | 3 |
| GEOG 203 & GEOG 213 | Planet Earth and Planet Earth Lab | 4 |
| Select one of the following: | 3 |
| GEOG 202 | Geography of the Global Village |
| GEOG 205 | Environmental Change |
| 300-level GEOG courses (p. 796) | 3 |
| Select one of the following: | 3 |
| 300-level GEOG courses (p. 796) | 3 |
The selection of courses must be made in agreement with the geography department advisor for minor programs.

Department of Geology and Geophysics

Geology

The field of geology includes the scientific study of all aspects of the solid Earth, from fundamental processes that shape it to knowledge that benefits society. The undergraduate curricula in geology foster critical thinking, and the application of scientific skills to the study of Earth materials (rocks, minerals, fossils, structures, landforms and subsurface fluids) and geologic processes. Courses provide a broad background in geology, emphasize knowledge transfer from other sciences to geologic problems and promote application to practical problems in petroleum exploration, environmental management and civil engineering.

The Department of Geology and Geophysics offers two undergraduate programs in geology, the Bachelor of Arts and the Bachelor of Science. The BS program is appropriate for students seeking careers as geologists or preparing for graduate school in geology, whereas the BA program is designed for students wishing to combine geology with other disciplines, and includes less rigorous mathematics and physics. Details of the two programs are given below along with specialty options and tracks.

Graduates must pass two Writing Intensive courses within their major. This requirement is described in Requirements for a Baccalaureate Degree (p. 24). GEOL 311 and any geology or geophysics class with a 9xx section number meets the requirement. To remain in satisfactory academic standing, students must maintain a 2.0 or better GPR in all technical courses (geology, geophysics, chemistry, math and physics). Some courses in geology require field trips. Students are required to pay expenses incurred on such trips.

Geophysics

Geophysics includes all areas of scientific inquiry that deal with the physical state of Earth and other planets and the dynamic processes, which act on and within planetary bodies. The Department of Geology and Geophysics offers the Bachelor of Science in Geophysics for students who wish to combine a proficiency in mathematics with an interest in Earth. The objective of this program is to develop a physically-motivated approach to the study of Earth phenomena, through treatment of physical and geological principles and development of mathematical tools. Graduates will be well-prepared for careers in the energy and environmental industries, and for advanced study at top-ranked graduate programs.

Minors in Geology and Geophysics

The Department of Geology and Geophysics offers minors in three separate programs: Geology, Geophysics and Earth Sciences. Minors provide opportunities for broadening a student’s background and tailoring the curriculum to specific career goals. For example, a minor in Geology or Geophysics may be especially beneficial to students majoring in fields that deal directly or indirectly with geological processes. These include agriculture, anthropology, archaeology, architecture, business, law, biology, chemistry, recreation and parks and soil science, to name a few.

The Departments of Geology and Geophysics, and Geography offer a minor in Geographic Information Science and Technology (GIST). GIST is concerned with the collection, analysis and display of spatial information using geographic information systems, remote sensing, global positioning satellites and field mapping. The minor combines courses in computer science, mapping, geodesy, geographical information systems and remote sensing. GIST is used to solve problems associated with land administration, environment and natural resource management, planning and population studies in addition to traditional surveying and mapping applications. This minor represents a focused course of study, which can be combined with traditional areas of study in geology and geophysics, geography, and other areas of science and policy studies.

Majors

- Bachelor of Arts in Geology (p. 393)
- Bachelor of Science in Geology, Environmental Geology Track (p. 394)
- Bachelor of Science in Geology, Petroleum Geology Track (p. 396)
- Bachelor of Science in Geophysics, Environmental Geophysics Track (p. 397)
- Bachelor of Science in Geophysics, Petroleum Geophysics Track (p. 398)
- Bachelor of Arts in Geology and MS in Oceanography, 5-Year Degree Program (p. 399)
- Bachelor of Science in Geology and MS in Oceanography, 5-Year Degree Program (p. 400)

Minors

- Geology Minor (p. 402)
- Geophysics Minor (p. 402)

Geology - BA

The Bachelor of Arts in Geology provides a foundation in geology for students who are not planning a career as a geologist. This program provides a basis for science-related careers, such as environmental law, pre-college teaching, science journalism, and resource management and marketing. Graduates will supplement their curriculum in geology with a minor designed around their career goals. The minor requires a minimum of 15 credit hours in one discipline, to be chosen in consultation with an advisor.

The BA program has less rigorous mathematics and physics requirements and less comprehensive geology requirements than the BS in Geology; therefore, the BS is the more appropriate option for students considering graduate study in geology.

Program Requirements

First Year

<table>
<thead>
<tr>
<th>Semester Credit Hours</th>
<th>Fall</th>
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<tr>
<td>3</td>
<td>CHEM 101 Fundamentals of Chemistry I</td>
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<td>CHEM 111 Fundamentals of Chemistry Laboratory I</td>
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<td>ENGL 104 Composition and Rhetoric</td>
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<td>GEOL 104 Physical Geology</td>
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<td>Term</td>
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<td>First Year</td>
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</table>

GEOL 330 Geologic Field Trips 3

Total Semester Credit Hours: 120

1. Fifteen hours of electives must be selected in a minor. Electives must be chosen in consultation with advisor.
2. Any 300- or 400-level geology or geophysics course not already required.
3. Any science, math, engineering or social science course that augments the degree with the approval of the advisor.
4. Six hours must be selected from courses that also satisfy the international and cultural diversity requirement.
5. General electives may not include STLC 100-499 (p. 993); SLCX 100-499; DEV 100-109; ENGL 103; GEOL 101-104 (p. 802); KINE 198, KINE 199; MATH 102, MATH 131, MATH 141, MATH 142, MATH 150, MATH 166, MATH 171; AERS 100-499 (p. 600); MLSC 100-499 (p. 889); NVSC 100-499 (p. 914); SOMS 100-499 (p. 982).

Geology - BS, Environmental Geology Track

The BS in Geology is considered the preparatory degree in the field of geology. Graduates will be prepared for careers in the energy and environmental industries, and for advanced study at top-ranked graduate programs. The first two years of the BS program in Geology provide students with the basics of geology and geophysics and the allied fields of chemistry, physics and mathematics. The junior and senior years involve more advanced study in the field of geology and the opportunity to concentrate study in specific disciplines through the selection of technical and geology electives. GEOL 300, during the summer following the junior year, serves as a capstone course in which students apply their geologic knowledge to solving real problems and collecting data during a six-week field season. Students are also encouraged to become involved in research problems with faculty members and can receive course credit for this activity through research hours (GEOL 291 and GEOL 491).

The BS is the appropriate degree for students intending to pursue graduate study in geology. Students desiring employment in industry are
encouraged to pursue an MS degree. Students planning a research or university teaching career should pursue a PhD degree.

The Environmental and Petroleum tracks use particular selections of electives to refine the degree.

Environmental Geology Track

This track is designed to provide a strong foundation in geology coupled with specialized training in work on some of society’s most pressing problems, including groundwater contamination and remediation, non-point-source pollution, water resources, and geologic hazards such as earthquakes, landslides, flooding, volcanism and surface deformation. Students completing the Environmental track of the BS in Geology are prepared to go on to graduate school for an advanced geoscience degree, or for employment in the environmental industry. Environmental geoscientists typically find careers with environmental and engineering consulting companies and other industrial corporations, governmental agencies or academia. Students are well-prepared for the Association of State Boards of Geology (ASBOG) Fundamentals of Geology exam, which is required for appointment as a Professional Geologist in the State of Texas.

Program Requirements

<table>
<thead>
<tr>
<th>First Year</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td><strong>Fall</strong></td>
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<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory I</td>
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<tr>
<td>&amp; CHEM 111</td>
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<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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<td>GEOL 104</td>
<td>Physical Geology</td>
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<td>MATH 151</td>
<td>Engineering Mathematics I</td>
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<tr>
<td>CHEM 102</td>
<td>Fundamentals of Chemistry II and Fundamentals of Chemistry Laboratory II</td>
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<td>Historical Geology</td>
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<td>MATH 152</td>
<td>Engineering Mathematics II</td>
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<td>GEOL 203</td>
<td>Mineralogy</td>
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<td>GEEP 341</td>
<td>Global Geophysics</td>
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<td>MATH 251</td>
<td>Engineering Mathematics III</td>
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<td>Mechanics</td>
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<td><strong>Spring</strong></td>
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<tr>
<td>GEOL 302</td>
<td>Introduction to Petrology</td>
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<tr>
<td>GEOL 309</td>
<td>Introduction to Geological Field Methods</td>
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<td>Electricity and Optics</td>
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<td>Igneous and Metamorphic Petrology</td>
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<td>Language, philosophy and culture elective (p. 21)</td>
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<td>GEOL 306</td>
<td>Sedimentology and Stratigraphy</td>
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<td>GEOL 311</td>
<td>Principles of Geological Writing</td>
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<td>GEOL 312</td>
<td>Structural Geology and Tectonics</td>
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<td>GEOL 451</td>
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<td>GEOL 300</td>
<td>Field Geology</td>
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<td>CVEN 365</td>
<td>Introduction to Geotechnical Engineering</td>
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<tr>
<td>GEG 331</td>
<td>Geomorphology</td>
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<td>GEG 390</td>
<td>Principles of Geographic Information Systems</td>
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<td>GEG 440</td>
<td>Engineering Geology</td>
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<td>GEG 410</td>
<td>Hydrogeology</td>
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<td>GEG 420</td>
<td>Environmental Geology</td>
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<td>GEG 440</td>
<td>Engineering Geology</td>
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<td>GEG 410</td>
<td>Global Change</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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<tr>
<td><strong>Spring</strong></td>
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<tr>
<td>American history or Government/political science elective (p. 23)</td>
<td>3</td>
</tr>
<tr>
<td>Social and behavioral science elective (p. 23)</td>
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<td>Technical elective</td>
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<td>Select two of the following:</td>
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<tr>
<td>CVEN 365</td>
<td>Introduction to Geotechnical Engineering</td>
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<tr>
<td>GEG 331</td>
<td>Geomorphology</td>
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<tr>
<td>GEG 390</td>
<td>Principles of Geographic Information Systems</td>
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<td>GEG 410</td>
<td>Hydrogeology</td>
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<td>GEG 420</td>
<td>Environmental Geology</td>
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<tr>
<td>GEG 440</td>
<td>Engineering Geology</td>
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</table>
Geology - BS, Petroleum Geology Track

The BS in Geology is considered the preparatory degree in the field of geology. Graduates will be prepared for careers in the energy and environmental industries, and for advanced study at top-ranked graduate programs. The first two years of the BS program in Geology provide students with the basics of geology and geophysics and the allied fields of chemistry, physics and mathematics. The junior and senior years involve more advanced study in the field of geology and the opportunity to concentrate study in specific disciplines through the selection of technical and geology electives. GEOL 300, during the summer following the junior year, serves as a capstone course in which students apply their geologic knowledge to solving real problems and collecting data during a six-week field season. Students are also encouraged to become involved in research problems with faculty members and can receive course credit for this activity through research hours (GEOL 291 and GEOL 491).

The BS is the appropriate degree for students intending to pursue graduate study in geology. Students desiring employment in industry are encouraged to pursue an MS degree. Students planning a research or university teaching career should pursue a PhD degree.

The Environmental and Petroleum tracks use particular selections of electives to refine the degree.

Petroleum Geology Track

This track provides students with the technical preparation for eventual employment in the field of petroleum exploration and extraction. The petroleum geology track is intended to prepare students for graduate study, as well as provide training for those who may be interested in service jobs in the oil and gas industry between their undergraduate and graduate education.

Program Requirements

First Year

Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
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<tbody>
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<td>CHEM 101</td>
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Spring

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Term Semester Credit Hours 15

Second Year

Fall

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Term Semester Credit Hours 14

Third Year

Fall

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<td>GEOL 451</td>
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<td>American history or Government/political science elective (p. 23)</td>
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<td>Language, philosophy and culture elective (p. 21)</td>
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Spring

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<td>GEOL 314</td>
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<td>GEOL 452</td>
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Summmer

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<td>GEOL 300</td>
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Term Semester Credit Hours 15

Fourth Year

Fall

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<td>Creative arts elective (p. 22)</td>
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<td>Geology elective (p. 802)</td>
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Spring

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<td>American history or Government/political science elective (p. 23)</td>
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Term Semester Credit Hours 16
Technical elective ² 6

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¹ Any approved 400-level geology or geophysics course not already required.
² Any science, math or engineering course that augments the degree with the approval of the advisor.
³ Six hours must be selected from courses that also satisfy the International and Cultural diversity requirement.

Many of the required geology classes prepare students for this track. Additional recommended classes include GEOL 400, GEOL 404, PETE 311, PETE 321, PETE 324 and PETE 402. Qualified students (GPR of 3.0 or higher with dean’s permission) may also take related graduate courses during the senior year. Such classes include GEOL 619, GEOL 622, GEOL 623, GEOL 624, GEOL 668, and GEOP 629.

Geophysics - BS, Environmental Geophysics Track

The first two years of the BS in Geophysics are similar to the BS in Geology, providing students with the fundamentals of geology, chemistry, physics, mathematics and computer science. Courses in geophysics during the junior and senior years emphasize knowledge transfer from the fields of math and physics to techniques and problems in both theoretical and applied geophysics. Technical electives allow students to focus on specific career objectives. The Environmental and Petroleum tracks prepare students for the most common career paths for geophysicists. Students are also encouraged to become involved in research problems with faculty members and can receive course credit for this activity through research hours (GEOP 291 and GEOP 491).

Whereas graduates from the Geophysics program will have employment opportunities in industry, the rigor of this degree is designed to prepare students for advanced study. The MS degree is generally considered to be the entry degree for professionals in the petroleum industry. Students interested in teaching in a university or research in an academic, government or industrial laboratory should seek the PhD.

Students must pass two Writing Intensive courses within their major. This requirement is described on page 24 of this catalog. GEOL 311 and any geology or geophysics class with a 9xx section number meet the requirement. To remain in satisfactory academic standing, students must maintain a 2.0 or better GPR in all technical courses (geology, geophysics, chemistry, math and physics). Some courses in geophysics require field trips. Students must pay expenses incurred on such trips.

Environmental Geophysics Track

This track focuses the geophysics degree on traditional and emerging methods used for hydrogeological, structural and stratigraphic characterization of the uppermost 100 meters, with applications to shallow resource and groundwater assessment and the solution of environmental and engineering problems. Students completing the Environmental track of the BS in Geophysics are prepared for graduate school, or for employment in the environmental industry. Environmental geophysicists typically work as independent environmental consultants or with industrial corporation or government agencies.

GEOP 413 and GEOP 435 provide the necessary grounding in seismic, electromagnetic, radar and other techniques used in environmental geophysics. Other recommended classes include GEOL 410, GEOL 420 and GEOL 440.

Program Requirements

First Year

<table>
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<tr>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>Fall</td>
</tr>
<tr>
<td>CHEM 107 &amp; CHEM 117 General Chemistry for Engineering Students and General Chemistry for Engineering Students Laboratory 4</td>
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<td>ENGL 104 Composition and Rhetoric 3</td>
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<tr>
<td>GEOL 104 Physical Geology 4</td>
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<tr>
<td>MATH 151 Engineering Mathematics I 4</td>
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<td>Term Semester Credit Hours</td>
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<tr>
<td>Spring</td>
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<tr>
<td>GEOL 106 Historical Geology 4</td>
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<tr>
<td>MATH 152 Engineering Mathematics II 4</td>
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<td>Communication elective (p. 20) 3</td>
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Second Year

<table>
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<tr>
<th>Term Semester Credit Hours</th>
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<tbody>
<tr>
<td>Fall</td>
</tr>
<tr>
<td>GEOL 203 Mineralogy 4</td>
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<tr>
<td>GEOP 341 Global Geophysics 3</td>
</tr>
<tr>
<td>MATH 251 Engineering Mathematics III 3</td>
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<td>PHYS 218 Mechanics 4</td>
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<td>Term Semester Credit Hours</td>
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<tr>
<td>GEOL 302 Introduction to Petrology 4</td>
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<tr>
<td>GEOL 309 Introduction to Geological Field Methods 3</td>
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<tr>
<td>MATH 308 Differential Equations 3</td>
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<td>PHYS 208 Electricity and Optics 4</td>
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Third Year

<table>
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<tbody>
<tr>
<td>Fall</td>
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<tr>
<td>GEOP 435 Methods of Geophysical Exploration 4</td>
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<td>PHYS 221 Optics and Thermal Physics 3</td>
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<td>American history or government/political science elective (p. 23) 3</td>
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<tr>
<td>Computer science (p. 698) ¹ 4</td>
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<tr>
<td>GEOL 311 Principles of Geological Writing 1</td>
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<tr>
<td>GEOL 312 Structural Geology and Tectonics 4</td>
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<tr>
<td>GEOP 413 Near-surface Geophysics 3</td>
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<tr>
<td>MATH 311 Topics in Applied Mathematics I 3</td>
</tr>
</tbody>
</table>
Geophysics - BS, Petroleum Geophysics Track

The first two years of the BS in Geophysics are similar to the BS in Geology, providing students with the fundamentals of geology, chemistry, physics, mathematics and computer science. Courses in geophysics during the junior and senior years emphasize knowledge transfer from the fields of math and physics to techniques and problems in both theoretical and applied geophysics. Technical electives allow students to focus on specific career objectives. The Environmental and Petroleum tracks prepare students for the most common career paths for geophysicists. Students are also encouraged to become involved in research problems with faculty members and can receive course credit for this activity through research hours (GEOP 291 and GEOP 491).

Whereas graduates from the Geophysics program will have employment opportunities in industry, the rigor of this degree is designed to prepare students for advanced study. The MS degree is generally considered to be the entry degree for professionals in the petroleum industry. Students interested in teaching in a university or research in an academic, government or industrial laboratory should seek the PhD.

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Program Requirements

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<th>Semester</th>
<th>Term</th>
<th>Credit Hours</th>
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<td>Fall</td>
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<td>MATH 412 Theory of Partial Differential Equations</td>
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<td>Technical electives</td>
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<td><strong>Total Semester Credit Hours</strong></td>
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</table>

1 Computer science course must entail programming with a high-level language.
2 Any science, math or engineering course that augments the degree with the approval of the advisor.
3 Six hours must be selected from courses that also satisfy the International and Cultural diversity requirement.
Computer science (p. 698) ¹ 4
Creative arts elective (p. 22) ³ 3

**Term Semester Credit Hours** 17

**Spring**
GEOL 311 Principles of Geological Writing 1
GEOL 312 Structural Geology and Tectonics 4
GEOP 413 Near-surface Geophysics 3
MATH 311 Topics in Applied Mathematics I 3
American history or Government/political science elective (p. 23) 3
Social and behavioral science elective (p. 23) ³ 3

**Term Semester Credit Hours** 17

Fourth Year

**Fall**
GEOP 421 Petroleum Seismology I 4
MATH 412 Theory of Partial Differential Equations 3
Language, philosophy and culture elective (p. 21) ³ 3
Technical electives ² 5

**Term Semester Credit Hours** 15

**Spring**
GEOP 470 Computational Geophysics 3
American history or Government/political science elective (p. 23) 3
Technical electives ² 8

**Term Semester Credit Hours** 14

Total Semester Credit Hours: 120

¹ Computer science course must entail programming with a high-level language.
² Any science, math or engineering course that augments the degree with the approval of the advisor.
³ Six hours must be selected from courses that also satisfy the International and Cultural diversity requirement.

**Program Requirements**

**First Year**

**Fall**
GEOL 104 Physical Geology 4
CHEM 101 & CHEM 111 Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory I 4
MATH 151 Engineering Mathematics I 4
ENGL 104 Composition and Rhetoric 3
GEOS First Year Seminar 1

**Term Semester Credit Hours** 16

**Spring**
GEOL 106 Historical Geology 4
CHEM 102 & CHEM 112 Fundamentals of Chemistry II and Fundamentals of Chemistry Laboratory II 4
MATH 152 Engineering Mathematics II 4
Communication (p. 20) 3

**Term Semester Credit Hours** 15

**Second Year**

**Fall**
GEOL 203 Mineralogy ¹ 4
GEOL 311 Principles of Geological Writing ¹ 1
GEOP 341 Global Geophysics ¹ 3
PHYS 218 Mechanics ¹ 4
Minor or free elective ¹ 3

**Term Semester Credit Hours** 15

- Applications to the Fast Track program will be submitted by July 1 after the completion of the student’s junior year. Applications submitted after that time will be evaluated on a case by case basis.
- Applicants must have a minimum undergraduate GPR of 3.0. Applicants must also earn a C or better in all Chemistry, Calculus and Physics courses. Once admitted to the program, students must maintain a minimum 3.0 GPR.
- A faculty advisor will be assigned to each student. Students may seek additional mentors, but a formal committee is not required.
- Students admitted into the Fast Track program must finish the entire 150 credit hours to obtain both the Bachelor’s and Master’s degrees. These students will be conferred with two degrees once they complete the 5th year of the concurrent program.
- Students admitted to the program will change from U4 to G7 status when they are admitted having completed at least 102 hours (end of spring semester, year 3).
- Students not accepted or not allowed to continue with the Fast Track Program will complete the 120 hour Bachelor's degree under the standard 4 year curriculum. These students may still apply to the traditional graduate program.

* Students will graduate at the completion of the 5th year in the Fast Track Program coursework (150 credit hours) with both Bachelor's and Master’s degrees. Students will complete the coursework in May of the 5th year.

**Geology - 5-Year Bachelor of Arts/Master of Science in Oceanography**

The Fast Track Program offers motivated and exceptional students the opportunity to achieve aspirations in an efficient program at Texas A&M, completing the Bachelor of Arts (B.A.) degree in the Department of Geology and Geophysics Geology Program and the Oceanography non-thesis M.S. degree in 5 years. There will be only two courses used for dual credit in this program. There is a total of 150 hours of coursework. The concurrent degree program will enable these motivated students to coordinate the required B.A. coursework (114 undergraduate credit hours plus 6 dual credit graduate courses) and non-thesis M.S. coursework (36 credit hours including the 6 dual credit graduate courses) to complete the required credit hours for each degree without diminishing scope or quality of work and within 5 years.

**Application and Eligibility:**

- Applications to the Fast Track program will be submitted by July 1 after the completion of the student’s junior year. Applications submitted after that time will be evaluated on a case by case basis.
- Applicants must have a minimum undergraduate GPR of 3.0. Applicants must also earn a C or better in all Chemistry, Calculus and Physics courses. Once admitted to the program, students must maintain a minimum 3.0 GPR.
- A faculty advisor will be assigned to each student. Students may seek additional mentors, but a formal committee is not required.
- Students admitted into the Fast Track program must finish the entire 150 credit hours to obtain both the Bachelor’s and Master’s degrees. These students will be conferred with two degrees once they complete the 5th year of the concurrent program.
- Students admitted to the program will change from U4 to G7 status when they are admitted having completed at least 102 hours (end of spring semester, year 3).
- Students not accepted or not allowed to continue with the Fast Track Program will complete the 120 hour Bachelor’s degree under the standard 4 year curriculum. These students may still apply to the traditional graduate program.

* Students will graduate at the completion of the 5th year in the Fast Track Program coursework (150 credit hours) with both Bachelor’s and Master’s degrees. Students will complete the coursework in May of the 5th year.

**Program Requirements**

**First Year**

**Fall**
GEOL 104 Physical Geology 4
CHEM 101 & CHEM 111 Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory I 4
MATH 151 Engineering Mathematics I 4
ENGL 104 Composition and Rhetoric 3
GEOS First Year Seminar 1

**Term Semester Credit Hours** 16

**Spring**
GEOL 106 Historical Geology 4
CHEM 102 & CHEM 112 Fundamentals of Chemistry II and Fundamentals of Chemistry Laboratory II 4
MATH 152 Engineering Mathematics II 4
Communication (p. 20) 3

**Term Semester Credit Hours** 15

**Second Year**

**Fall**
GEOL 203 Mineralogy ¹ 4
GEOL 311 Principles of Geological Writing ¹ 1
GEOP 341 Global Geophysics ¹ 3
PHYS 218 Mechanics ¹ 4
Minor or free elective ¹ 3

**Term Semester Credit Hours** 15

¹ Computer science course must entail programming with a high-level language.
² Any science, math or engineering course that augments the degree with the approval of the advisor.
³ Six hours must be selected from courses that also satisfy the International and Cultural diversity requirement.
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<tr>
<td>Spring</td>
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<td>Fall</td>
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<td>Third Year</td>
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<td>Fifth Year</td>
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### Spring
- GEOL 302: Introduction to Petrology
  - Term Semester Credit Hours: 4
- GEOL 306: Sedimentology and Stratigraphy
  - Term Semester Credit Hours: 4
- PHYS 208: Electricity and Optics
  - Term Semester Credit Hours: 4
- Government/Political science (p. 23)
  - Term Semester Credit Hours: 3
- Minor or free elective
  - Term Semester Credit Hours: 3

### Term Semester Credit Hours: 15

### Spring
- Advanced specialized OCNG graduate course
  - Term Semester Credit Hours: 3
- Advanced specialized OCNG graduate course
  - Term Semester Credit Hours: 3
- Capstone Experience II
  - Term Semester Credit Hours: 3

### Total Semester Credit Hours: 18

1. Any of the required courses may be taken during the summer sessions to diminish the heavy semester loads during Years Two and Three.
2. If students use six credits of allowed OCNG courses (e.g. OCNG 251 or OCNG 401, OCNG 252, OCNG 350, OCNG 451, OCNG 485) as minor or free electives, they will receive an OCNG minor with their BA in GEOL.
3. A second W course is required. GEOL 312 is offered as a W option when taught by Dr. Julie Newman, and other GEOL electives also fulfill the W requirement (including GEOL 491 when arranged with the permission of the instructor).
4. Students will not be permitted to receive credit for both the 400- and 600-level versions of certain courses because the content and learning outcomes are too similar (e.g. OCNG 410/OCNG 608, OCNG 440/OCNG 640; GEOS 470/OCNG 657).
5. Graduate courses will be taken for dual undergraduate/graduate credit and may contribute to the minor.

### Admission Process
Apply: End of junior year after 6 semesters; minimum GPR = 3.0.

Decision: August prior to starting graduate course work in Fall of Senior Year.

Change to graduate status (G7).

Apply for graduate degree plan upon approval of G7 status

Total undergraduate credit hours: 120

Total graduate credit hours: 36 (36 credits required for non-thesis MOST)

Total credits actually taken: 150

### Geology - 5-Year Bachelor of Science/Master of Science in Oceanography

The Fast Track Program offers motivated and exceptional students the opportunity to achieve aspirations in an efficient program at Texas A&M, completing the Bachelor of Science (B.S.) degree in the Department of Geology and Geophysics Geology Program and the Oceanography non-thesis M.S. degree in 5 years. There will be only two courses used for dual credit in this program. There is a total of 150 hours of coursework. The concurrent degree program will enable these motivated students to coordinate the required B.S. coursework (114 undergraduate credit hours plus 6 dual credit graduate courses) and non-thesis M.S. coursework (36 credit hours including the 6 dual credit graduate courses) to complete the
required credit hours for each degree without diminishing scope or quality of work and within 5 years.

Application and Eligibility

- Applications to the Fast Track program will be submitted by July 1 after the completion of the student’s junior year. Applications submitted after that time will be evaluated on a case by case basis.
- Applicants must have a minimum undergraduate GPR of 3.0. Applicants must also earn a C or better in all Chemistry, Calculus and Physics courses. Once admitted to the program, students must maintain a minimum 3.0 GPR.
- A faculty advisor will be assigned to each student. Students may seek additional mentors, but a formal committee is not required.
- Students admitted into the Fast Track program must finish the entire 150 credit hours to obtain both the Bachelor’s and Master’s degrees. These students will be conferred with two degrees once they complete the 5th year of the concurrent program.

Students will graduate at the completion of the 5th year in the Fast Track Program coursework (150 credit hours) with both Bachelor’s and Master’s degrees. Students will complete the coursework in May of the 5th year.

Program Requirements

First Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<td>GEOL 104</td>
<td>Physical Geology</td>
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<td>CHEM 101</td>
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<td>GEOL 106</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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<td></td>
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<tr>
<td>Second Year</td>
<td>Fall</td>
<td>GEOL 203</td>
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<td>GEOL 311</td>
<td>Principles of Geological Writing 1,2</td>
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<td>GEOP 341</td>
<td>Global Geophysics 1</td>
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<th>Semester</th>
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<th>Course Title</th>
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Third Year

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<td>Government/Political science (p. 23) 1</td>
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Fourth Year

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<td>Language, philosophy and culture (p. 21)</td>
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<td>OCNG 657</td>
<td>Data Methods and Graphical Representation in Oceanography 3</td>
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<td>OCNG 620</td>
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Total Semester Credit Hours: 129
Fifth Year

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1. Any of the required courses may be taken during the Summer Sessions to diminish the heavy semester loads during Years Two and Three.
2. A second W course is required. GEOL 312 is offered as a W option when taught by Dr. Julie Newman, and other GEOL electives also fulfill the W requirement (including GEOL 491 when arranged with the permission of the instructor).
3. Students will not be permitted to receive credit for both the 400- and 600-level versions of certain courses because the content and learning outcomes are too similar (e.g. OCNG 410/OCNG 608, OCNG 440/OCNG 640; GEOS 470/OCNG 657)
4. Graduate courses will be taken for dual undergraduate/graduate credit.

Admission Process

Apply: End of junior year after 6 semesters; minimum GPR = 3.0.
Decision: August prior to starting graduate course work in Fall of Senior Year.
Change to graduate status (G7).
Apply for graduate degree plan upon approval of G7 status
Total Semester Credit Hours 9 c(9 graduate)
Total undergraduate credit hours: 120
Total graduate credit hours: 36 (36 credits required for non-thesis MOST)
Total credits actually taken: 150

Geology - Minor

The Department of Geology and Geophysics offers a minor in Geology.

Program Requirements

1. Minimum of 15 credit hours in Geology or Geophysics. May not include GEOL 308.
2. Minimum of 6 credits must be taken in residence at either Texas A&M in College Station or Texas A&M in Galveston.
3. Must include one of GEOL 101, GEOL 104 or GEOL 320.
4. Maximum of 4 credits may be from selected courses in Geography or Oceanography, with approval of advisor (any substitutions must be approved by the department head).
5. Minimum of 6 credits at the 300-400 level.
6. Minimum of 2.0 cumulative GPA for all courses in the minor.

Geophysics - Minor

The Department of Geology and Geophysics offers a minor in Geophysics.

Program Requirements

1. Minimum of 15 credit hours in Geology or Geophysics. May not include GEOL 308.
2. Minimum of 6 credits must be taken in residence at either Texas A&M in College Station or Texas A&M in Galveston.
3. Minimum of 9 credit hours in Geophysics.
4. Maximum of 4 credits may be from selected courses in Geography or Oceanography, with approval of advisor (any substitutions must be approved by the department head).
5. Minimum of 6 credits at the 300-400 level.
6. Minimum of 2.0 cumulative GPA for all courses in the minor.

Department of Oceanography

Studies in Oceanography

Oceanography is an interdisciplinary science that focuses on the oceans, their contents and their boundaries. Degree programs are offered at the graduate level, leading to the Master of Science and the Doctor of Philosophy degrees in oceanography. In addition, various undergraduate courses are offered, and qualified undergraduate students may participate in a 15-credit minor in Oceanography. In addition, the department is initiating a 3+2 Program.

Oceanography is unusual as a graduate discipline. Whereas graduate programs in most disciplines lead to progressively greater degrees of specialization, oceanography as an interdisciplinary field takes graduates of biology, chemistry, geology, mathematics, physics, geophysics, meteorology or engineering and initially generalizes and broadens their education with a core of required courses. These core courses include the four subject areas of the oceanography program (biological, chemical, geological/geophysical and physical oceanography) and a seminar covering the state of the science. The student then refocuses in a particular subject area to pursue research and further study.

Effective study of oceanography requires a thorough undergraduate training in one of the pertinent undergraduate sciences, mathematics or engineering. During the undergraduate years, a student should consult with the oceanography faculty while enrolled in an appropriate undergraduate curriculum.

Faculty

Baldauf, Jack G, Professor
Oceanography
PhD, University of California, Berkeley, 1985

Biggs, Douglas C, Professor
Oceanography
PhD, Massachusetts Institute of Technology, 1976
Oceanography is an interdisciplinary science that focuses on the oceans, their contents and their boundaries. Degree programs are offered at the graduate level, leading to the Master of Science and the Doctor of Philosophy degrees in oceanography. In addition, various undergraduate courses are offered, and qualified undergraduate students may participate in a 15-credit minor in Oceanography. A minor consists of at least 15 hours from any of the undergraduate OCNG courses. However, only one of OCNG 251 or OCNG 401 can be used for the minor. At least 6 hours must be upper division courses in the minor. In addition, the department is initiating a 3+2 program.

Oceanography is unusual as a graduate discipline. Whereas graduate programs in most disciplines lead to progressively greater degrees of specialization, oceanography as an interdisciplinary field takes graduates of biology, chemistry, geology, mathematics, physics, geophysics, meteorology, or engineering and initially generalizes and broadens their education with a core of required courses. These core courses include the four subject areas of the oceanography program (biological, chemical, geological/geophysical and physical oceanography) and a seminar covering the state of the science. The student then refocuses in a particular subject area to pursue research and further study.

Effective study of oceanography requires a thorough undergraduate training in one of the pertinent undergraduate sciences, mathematics or engineering. During the undergraduate years, a student should consult with the oceanography faculty while enrolled in an appropriate undergraduate curriculum.

**Program Requirements**

Select 15 semester credits from the following:

- OCNG 251 Oceanography
- OCNG 252 Oceanography Laboratory
At least 6 hours must be upper division courses in the minor.

University Studies Programs

The College of Geosciences offers degrees in University Studies. A University Studies degree differs from a traditional “major” in that it consists of a concentration of 26 hours and two minors of 15-18 hours each. The University Studies degree format was created to provide students the flexibility to combine areas of study that are of special interest.

Majors

- Bachelor of Science in University Studies, Geographic Information Science and Technology Concentration (p. 390)
- Bachelor of Science in University Studies, Geography Concentration (p. 390)
College of Liberal Arts

Administrative Officers
Dean - Pamela R. Matthews, Ph.D.
Associate Dean - Patricia A. Hurley, Ph.D.
Associate Dean - Steven M. Oberhelman, Ph.D.
Associate Dean - Srividya Ramasubramanian, Ph.D.
Associate Dean - Gerianne Alexander, Ph.D.
Associate Dean - Paul Wellman, Ph.D.
Assistant Dean - Cheryl L. Hanks, M.A.

General Statement
The College of Liberal Arts offers students an opportunity to explore the intellectual achievements of humankind through a disciplined and responsible study of issues that have been of enduring importance to people. Thus, courses in liberal arts help students develop a sensitivity to the questions and values that confront them in their daily lives. At the same time, skills are built which can be put to use in solving complex problems. One of the program's principal objectives is to achieve the hallmark of an educated person: a fundamental knowledge of the forces that have shaped and continue to direct our cultural identity.

The purpose of the undergraduate program in the College of Liberal Arts is to foster independent thinking by offering students a broad education. To achieve this, the college supports the aims of the University Core Curriculum, which requires all students to engage in specific studies intended to promote an awareness of their heritage, their culture, and their environment. Students who choose to major in one of the Liberal Arts disciplines will complete a curriculum designed to promote this breadth of understanding while providing a focus through concentration in one specific area of study.

The first two years of undergraduate study in The College of Liberal Arts introduce students to the full range of arts, humanities, science, mathematics and social science areas that are established in the University Core Curriculum. During the last two years, students concentrate on their major and minor fields of study and complete their program with appropriate elective hours. Throughout the program, skills in critical thinking and in communication are developed, strengthened and polished.

Many graduates with bachelor's degrees in liberal arts continue their study at the graduate level in an academic discipline or in a profession such as medicine or law. The majority go directly into the job market. Studies have shown that liberal arts graduates are very successful in a variety of activities in commerce, business, or public service because the knowledge and skills they have developed are valuable in today's world. Many businesses actively recruit liberal arts majors.

Thus, whether as a foundation for further study or as a broad education preparatory to positions in business, industry, and the public domain, a liberal arts degree has intrinsic worth and enduring value.

General Degree Requirements
Degree requirements for Liberal Arts majors are organized into:

1. General Requirements, including University Core Curriculum requirements and College of Liberal Arts requirements
2. Requirements of the Major Field of Study
3. Requirements of the Minor Field of Study
4. Electives

A minimum of 120 acceptable hours of coursework is required for the baccalaureate degree. A minimum of 36 hours of 300- or 400-level coursework must be completed at Texas A&M University.

General Requirements
The areas listed below include University Core Curriculum requirements and College of Liberal Arts requirements. The completion of requisite hours in these areas will thus satisfy both University Core Curriculum and college requirements.

Bachelor of Arts Requirements

Communication
ENGL 104 Composition and Rhetoric
Select one of the following: 3
- ENGL 203 Writing about Literature
- ENGL 210 Technical and Business Writing
- COMM 203 Public Speaking
- COMM 205 Communication for Technical Professions
- COMM 243 Argumentation and Debate

Literature in English
Select two of the following: 6
- ENGL 202 Environmental Literature
- ENGL 203 Writing about Literature
- ENGL 204 Introduction to African-American Literature
- AFST 204
- ENGL 205 Introduction to Africana Literature
- AFST 205
- ENGL 206 Twenty-first Century Literature and Culture
- ENGL 212 Shakespeare
- ENGL 219 Literature and the Other Arts
- ENGL 221 World Literature
- MODL 221
- ENGL 222 World Literature
- MODL 222
- ENGL 227 American Literature: The Beginnings to Civil War
- ENGL 228 American Literature: Civil War to Present
- ENGL 231 Survey of English Literature I
- ENGL 232 Survey of English Literature II
- ENGL 313 Medieval English Literature
- ENGL 314 The English Renaissance
- ENGL 315 Seventeenth-Century Literature
- ENGL 316 Eighteenth-Century Literature and Culture
- ENGL 317 Early British Drama
- ENGL 321 Nineteenth-Century Literature (Romantic)
- ENGL 322 Nineteenth-Century Literature (Victorian)
- ENGL 323 The American Renaissance
**College of Liberal Arts**

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<td>Science Fiction Present and Past</td>
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<td>Life and Literature of the Southwest</td>
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<td>Life and Literature of the American South</td>
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<td>Folklore, Literature, and World Cultures</td>
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### Foreign Language Option 1

Select one of the following:

| ARAB 101/ARAB 102 | Beginning Arabic I and Beginning Arabic II |
| CHIN 101/CHIN 102 | Beginning Chinese I and Beginning Chinese II |
| CLAS 101/CLAS 102 | Beginning Classical Greek I and Beginning Classical Greek II |
| CLAS 121/CLAS 122 | Beginning Latin I and Beginning Latin II |
| FREN 101/FREN 102 | Beginning French I and Beginning French II |
| GERM 101/GERM 102 | Beginning German I and Beginning German II |
| ITAL 101/ITAL 102 | Beginning Italian I and Beginning Italian II |
| JAPN 101/JAPN 102 | Beginning Japanese I and Beginning Japanese II |
| RUSS 101/SPAN 102 | Beginning Russian I and Beginning Spanish II |
| SPAN 101/SPAN 102 | Beginning Spanish I and Beginning Spanish II |
Select one of the following:

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<tr>
<td>CHIN 201</td>
<td>Intermediate Chinese I</td>
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<tr>
<td>&amp; CHIN 202</td>
<td>and Intermediate Chinese II</td>
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<tr>
<td>CLAS 211</td>
<td>Intermediate Greek</td>
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<td>or CLAS 311</td>
<td>or Advanced Greek: New Testament</td>
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<td>or CLAS 312</td>
<td>or Advanced Classical Greek Poetry</td>
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<td>or CLAS 313</td>
<td>or Advanced Classical Greek Prose</td>
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<td>and Intermediate Spanish II</td>
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<td>or Field Studies Abroad I and Field Studies Abroad II</td>
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</table>

Option 2

Foreign language placement test results determine foreign language course levels required.

Option 3

Advanced Placement or Reading Achievement foreign language test results determine foreign language course levels required.

Mathematics elective (3 hours must be in MATH) (p. 20)

Life and Physical Sciences

Life and physical sciences elective (p. 20)

Creative Arts and Language, Philosophy and Culture

Creative arts elective (p. 22)

Language, philosophy and culture elective (p. 21)

Social and Behavioral Sciences

Social and behavioral sciences elective (p. 23)

American History

American history elective (p. 23)

Government/Political Science

Government/Political science elective (p. 23)

International Cultures and Diversity

International and cultural diversity elective (p. 34)

Total Semester Credit Hours

1. Students must demonstrate the ability to express themselves in acceptable written English. The College requirement is satisfied if a student earns a grade of C or better in ENGL 203. Students who do not meet this standard must repeat the course prior to completing 60 hours and earn a grade of C or better or must immediately arrange with the director of the writing laboratory to be certified as competent in writing.

2. ENGL 203 will count toward the Communication requirement or the Literature in English requirement, but will not count toward both requirements.

3. Students must take a foreign language placement test if they:
   - intend to enroll for the first time in a college Spanish, French, German, Russian, Arabic, Chinese, Japanese, Classical Greek, Italian, or Latin course
   - have knowledge of the language acquired in any way
   - have no college credit in the language

   The placement test serves as a basis for credit by examination. Placement tests are offered throughout the calendar year by the Department of Hispanic Studies for Spanish and by the Department of International Studies for all other languages. Students who have taken the Advanced Placement (AP) test or the Reading Achievement test in their foreign language of choice may substitute the test results for the placement exam.

4. No course used to fulfill this requirement may fulfill any other college of University requirement except in the minor field of study.

5. Minimum of 3 and maximum of 6 semester credit hours in Creative Arts.

6. Courses in military, air or naval science may not be substituted for required courses.

7. The list of approved courses is available in the degree audit for each major.

**Bachelor of Science Requirements**

**Communication**

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
</tr>
<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
</tr>
<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
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Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
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<tbody>
<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
</tr>
<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
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<tr>
<td>ENGL 202</td>
<td>Environmental Literature</td>
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<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
</tr>
<tr>
<td>ENGL 204/AFST 204</td>
<td>Introduction to African-American Literature</td>
</tr>
<tr>
<td>ENGL 205/AFST 205</td>
<td>Introduction to Africana Literature</td>
</tr>
<tr>
<td>ENGL 206</td>
<td>Twenty-first Century Literature and Culture</td>
</tr>
<tr>
<td>ENGL 212</td>
<td>Shakespeare</td>
</tr>
<tr>
<td>ENGL 219</td>
<td>Literature and the Other Arts</td>
</tr>
<tr>
<td>ENGL 221/MODL 221</td>
<td>World Literature</td>
</tr>
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<td>ENGL 222/MODL 222</td>
<td>World Literature</td>
</tr>
<tr>
<td>ENGL 227</td>
<td>American Literature: The Beginnings to Civil War</td>
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<tr>
<td>ENGL 228</td>
<td>American Literature: Civil War to Present</td>
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<td>ENGL 231</td>
<td>Survey of English Literature I</td>
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<td>ENGL 232</td>
<td>Survey of English Literature II</td>
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<td>Medieval English Literature</td>
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<td>The English Renaissance</td>
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<td>ENGL 315</td>
<td>Seventeenth-Century Literature</td>
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<td>ENGL 316</td>
<td>Eighteenth-Century Literature and Culture</td>
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<td>ENGL 317</td>
<td>Early British Drama</td>
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<td>ENGL 321</td>
<td>Nineteenth-Century Literature (Romantic)</td>
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<td>ENGL 322</td>
<td>Nineteenth-Century Literature (Victorian)</td>
</tr>
<tr>
<td>ENGL 323</td>
<td>The American Renaissance</td>
</tr>
<tr>
<td>ENGL 329/AFST 329</td>
<td>African-American Literature Pre-1930</td>
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<tr>
<td>ENGL 330</td>
<td>Arthurian Literature</td>
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<td>ENGL 331</td>
<td>Fantasy Literature</td>
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<td>ENGL 333/ENGL 333</td>
<td>Gay and Lesbian Literature</td>
</tr>
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<td>ENGL 334</td>
<td>Science Fiction Present and Past</td>
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<tr>
<td>ENGL 336</td>
<td>Life and Literature of the Southwest</td>
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<td>ENGL 337</td>
<td>Life and Literature of the American South</td>
</tr>
<tr>
<td>ENGL 338</td>
<td>American Ethnic Literature</td>
</tr>
<tr>
<td>ENGL 339/AFST 339</td>
<td>African-American Literature Post-1930</td>
</tr>
<tr>
<td>ENGL 340</td>
<td>Modern and Contemporary Drama</td>
</tr>
<tr>
<td>ENGL 350</td>
<td>Twentieth-Century Literature to World War II.</td>
</tr>
<tr>
<td>ENGL 352</td>
<td>Literature, World War II to Present.</td>
</tr>
<tr>
<td>ENGL 356/FILM 356</td>
<td>Literature and Film</td>
</tr>
<tr>
<td>ENGL 357</td>
<td>Native American Rhetorics and Literatures</td>
</tr>
<tr>
<td>ENGL 360</td>
<td>Literature for Children</td>
</tr>
<tr>
<td>ENGL 361</td>
<td>Young Adult Literature</td>
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<tr>
<td>ENGL 362/ENGL 362</td>
<td>Latino/a Literature</td>
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<tr>
<td>ENGL 365/RELS 365</td>
<td>The Bible as Literature</td>
</tr>
<tr>
<td>ENGL 372</td>
<td>American Poetry</td>
</tr>
<tr>
<td>ENGL 373</td>
<td>American Realism and Naturalism</td>
</tr>
<tr>
<td>ENGL 374/AFST 374</td>
<td>Women Writers</td>
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<tr>
<td>ENGL 375</td>
<td>Nineteenth-Century American Novel</td>
</tr>
<tr>
<td>ENGL 376</td>
<td>The American Novel Since 1900</td>
</tr>
<tr>
<td>ENGL 377</td>
<td>The British Novel to 1870.</td>
</tr>
<tr>
<td>ENGL 378</td>
<td>The British Novel, 1870 to Present.</td>
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<tr>
<td>ENGL 379/AFST 379</td>
<td>Postcolonial Literatures</td>
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<tr>
<td>ENGL 390</td>
<td>Studies in British Literature</td>
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<tr>
<td>ENGL 391</td>
<td>Folklore, Literature, and World Cultures</td>
</tr>
<tr>
<td>ENGL 392/RELS 392</td>
<td>Studies in Literature, Religion and Culture</td>
</tr>
<tr>
<td>ENGL 393/AFST 393</td>
<td>Studies in Africana Literature and Culture</td>
</tr>
<tr>
<td>ENGL 394</td>
<td>Studies in Genre</td>
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<td>ENGL 396</td>
<td>Studies in American Literature</td>
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<tr>
<td>ENGL 412</td>
<td>Studies in Shakespeare</td>
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<td>ENGL 414</td>
<td>Milton</td>
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<td>ENGL 415</td>
<td>Studies in a Major Author</td>
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<tr>
<td>ENGL 416</td>
<td>Chaucer</td>
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<td>ENGL 474/WGST 474</td>
<td>Studies in Women Writers</td>
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<td>AFST 204/ENGL 204</td>
<td>Introduction to African-American Literature</td>
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<tr>
<td>AFST 205/ENGL 205</td>
<td>Introduction to Africana Literature</td>
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<tr>
<td>AFST 329/ENGL 329</td>
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<td>AFST 339/ENGL 339</td>
<td>African-American Literature Post-1930</td>
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<td>Postcolonial Literatures</td>
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<tr>
<td>AFST 393/ENGL 393</td>
<td>Studies in Africana Literature and Culture</td>
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<tr>
<td>FILM 356/ENGL 356</td>
<td>Literature and Film</td>
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<td>HISP 362/ENGL 362</td>
<td>Latino/a Literature</td>
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<td>MODL 221/ENGL 221</td>
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<td>WGST 333/ENGL 333</td>
<td>Gay and Lesbian Literature</td>
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<td>WGST 374/ENGL 374</td>
<td>Women Writers</td>
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### Foreign Language
Select one of the following: 8

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<tr>
<th>Course</th>
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<tr>
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<td>Beginning Arabic I</td>
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<td>&amp; ARAB</td>
<td>Beginning Arabic II</td>
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</tr>
<tr>
<td>CHIN 101</td>
<td>Beginning Chinese I</td>
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<tr>
<td>&amp; CHIN</td>
<td>Beginning Chinese II</td>
<td>102</td>
</tr>
<tr>
<td>CLAS 101</td>
<td>Beginning Classical Greek I</td>
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</tr>
<tr>
<td>&amp; CLAS</td>
<td>Beginning Classical Greek II</td>
<td>102</td>
</tr>
<tr>
<td>CLAS 121</td>
<td>Beginning Latin I</td>
<td></td>
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<tr>
<td>&amp; CLAS</td>
<td>Beginning Latin II</td>
<td>122</td>
</tr>
<tr>
<td>FREN 101</td>
<td>Beginning French I</td>
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<tr>
<td>&amp; FREN</td>
<td>Beginning French II</td>
<td>102</td>
</tr>
<tr>
<td>GERM 101</td>
<td>Beginning German I</td>
<td></td>
</tr>
<tr>
<td>&amp; GERM</td>
<td>Beginning German II</td>
<td>102</td>
</tr>
<tr>
<td>ITAL 101</td>
<td>Beginning Italian I</td>
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<tr>
<td>&amp; ITAL</td>
<td>Beginning Italian II</td>
<td>102</td>
</tr>
<tr>
<td>JAPN 101</td>
<td>Beginning Japanese I</td>
<td></td>
</tr>
<tr>
<td>&amp; JAPN</td>
<td>Beginning Japanese II</td>
<td>102</td>
</tr>
<tr>
<td>RUSS 101</td>
<td>Beginning Russian I</td>
<td></td>
</tr>
<tr>
<td>&amp; RUSS</td>
<td>Beginning Russian II</td>
<td>102</td>
</tr>
<tr>
<td>SPAN 101</td>
<td>Beginning Spanish I</td>
<td></td>
</tr>
<tr>
<td>&amp; SPAN</td>
<td>Beginning Spanish II</td>
<td>102</td>
</tr>
</tbody>
</table>

### Mathematics
Mathematics elective (3 hours must be in MATH) (p. 20) 6

### Life and Physical Sciences
Life and physical sciences elective (p. 20) 9

### Creative Arts and Language, Philosophy and Culture
Creative arts elective (p. 22) 3

Language, philosophy and culture elective (p. 21) 3

### Social and Behavioral Sciences
Social and behavioral sciences elective (p. 23) 3

### American History
American history elective (p. 23) 5

### Government/Political Science
Govern/Political science elective (p. 23) 5

### International Cultures and Diversity
International and cultural diversity elective (p. 34) 6

### Computing Science, Mathematics, Science, Statistics
Prescribed courses by major department 6

**Total Semester Credit Hours** 74

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1. Students must demonstrate the ability to express themselves in acceptable written English. The College requirement is satisfied if a student earns a grade of C or better in ENGL 203. Students who do not meet this standard must repeat the course prior to completing 60 hours and earn a grade of C or better or must immediately arrange with the director of the writing laboratory to be certified as competent in writing.

2. ENGL 203 will count toward the Communication requirement or the Literature in English requirement, but will not count toward both requirements.

3. No course used to fulfill this requirement may fulfill any other college of University requirement except in the minor field of study.

4. Minimum of 3 and maximum of 6 semester credit hours in Creative Arts.

5. Courses in military, air or naval science may not be substituted for required courses.

6. The list of approved courses is available in the degree audit for each major.

### Major Field of Study
Each department sets its own requirements for the major, including no fewer than 27 hours of coursework and no more than 33 hours (except for the BA in Music). At least 12 semester hours in the major must be completed in advanced courses (300- and 400-level), and at least 12 semester hours in the major field must be completed in residence at Texas A&M. A grade of C or higher is required in a course to be counted toward the major.

### Minor Field of Study
Completion of a minor is not a requirement of the College of Liberal Arts; however, individual departments may require their majors to have a minor. Students should consult with an advisor in their major department to determine if a minor is required. The minor program comprises 15–18 hours with a minimum of 6 hours in residence at the 300- to 400-level. Minor programs are recognized on the transcript after graduation, but not on the diploma. A grade of C or higher is required if a course is to be counted toward the minor field. Each student who is required to complete a minor, or who chooses to do so, should contact the department that offers the minor to determine which specific courses are mandated. The student’s college and/or major department determines the number of minor programs a student may seek and shall be responsible for advising after the student receives signed approval from the department, program, or college granting the minor program.

### Electives
To enhance the traditionally broad background of the liberal arts graduate, undergraduate students are allowed to include in their degree program a minimum of 9 semester hours of free elective courses. These courses may be chosen from any field within the University except from a student’s major field. (See section on “Requirements for a Baccalaureate Degree” in this catalog.) All other elective hours must be selected with the approval of the student’s advisor and dean.

- STLC 101, STLC 102 and STLC 289 may only be taken on an S/U basis.
- Lower level (100 and 200 level) military science coursework (AERS, MLSC, NVSC) does not apply to degree requirements in the College of Liberal Arts.
• No more than 14 semester credit hours combined of KINE 199 and upper-level Military Science or SOMS courses may be used as electives.
• Any undergraduate student may take up to four semester credit hours of KINE 199 on an S/U basis.
• In the College of Liberal Arts, students who have less than a 2.0 GPR and who enroll in KINE 199 must enroll in the course on an S/U basis.
• Juniors and seniors in the College of Liberal Arts whose cumulative GPR is 2.50 or above may take up to 12 semester credit hour hours of “free electives” on an S/U basis.
• Transfer students must take at least 12 semester credit hours of regular coursework at Texas A&M before enrolling in a course on an S/U basis.
• Courses offered only on an S/U basis may be taken by freshmen and sophomores. These courses count toward the 12 semester credit hour limit.

Combined Degree Plan, Double Degree and Double Major
Students may pursue a program to qualify for two bachelor’s degrees, either a Bachelor of Arts and a Bachelor of Science degree from different departments, or two Bachelor of Arts or two Bachelor of Science degrees, with the second degree from another college. Alternatively, instead of a major and a minor field, students in the College of Liberal Arts may elect to have two Liberal Arts major fields of study. Both majors may be within the college, or one major may be outside the college, provided both majors lead to the same baccalaureate degree.

Students must declare the double degree no later than the semester in which they will complete 90 hours. Students must have and maintain at least a 3.0 GPR cumulative and in the majors (or the minimum departmental GPR requirement in the major, whichever is higher), with at least a 3.0 GPR in at least 9 hours in the second field of study at the time of declaration. Before declaring the double degree, students should consult with the appropriate advisors to formulate the combined degree plan. The following requirements must be met: the student must
1. satisfy all University and college requirements
2. complete all required courses in each major, if both majors are in the College of Liberal Arts (i.e., take all courses that are specifically listed in each regular degree program)
3. in cases where one major is in the College of Liberal Arts and the other major is in another college, the student shall take in his or her liberal arts major field of study the same number of credit hours required of regular majors in that field and also satisfy whatever conditions are set by the other college for its major field

Candidates for a double bachelor’s degree must have been in residence at least two academic years and must complete all essential work of the second curriculum not covered in the first. To qualify for the double degree, the student must complete a minimum of 30 semester credit hours more than the higher number of semester credit hours required for either degree.

Curricular Options
International and Intercultural Experiences
The International and Cultural Diversity requirement encourages all students to learn about attitudes and cultures different from their own. All students are required to select from a list of approved courses that foster greater awareness of our interdependent and diverse world.

Students also may select, as free electives, courses which address cultural diversity issues in the United States. Courses in this area encourage students to focus on issues of race, ethnicity and gender and to develop a broader understanding of the diverse cultures and traditions in the United States.

Further opportunity to increase international and national intercultural awareness can be accomplished through study abroad and internship programs. More information on these programs is available through the Undergraduate Programs Office in the College of Liberal Arts.

Liberal Arts Honors Program
The College of Liberal Arts encourages qualified majors to participate in its Honors Program, which is designed for academically talented high school graduates who have distinguished secondary school records (top 10%) and high scores on achievement tests (1250 SAT or 28 ACT). Students accepted into the program take courses that foster an interdisciplinary outlook characteristic of the Liberal Arts and that synthesize knowledge from other courses. Participants work in small classes with some of the most distinguished faculty at Texas A&M University. Students develop their own interests and have the option to write an honors thesis under the direct supervision of a professor with whom they have chosen to work. For information about Texas A&M Honors Program and Fellows Program (i.e., the senior thesis), see the Honors and Undergraduate Research (http://honors.tamu.edu) website. Individual departments may have their own Honors program for their majors.

Interdisciplinary Minors
Interdisciplinary minors are offered in Africana Studies, Asian Studies, Comparative Cultural Studies, Film Studies, Hispanic Studies, Journalism Studies, Latino/a Mexican American Studies, Religious Studies, and Women’s and Gender Studies. Specific course requirements and options are available from each interdisciplinary program director.

Cooperative Education Program
Cooperative education enables students to gain practical work experience and a salary while completing academic requirements. During the four-year academic program, co-op students complete two to four periods of work away from campus, gaining experience through on-the-job training and thus improving their opportunities for future employment. An advisor in the cooperative education office provides additional information about this program.

Government Service (MPA Programs)
Most graduate programs in public administration recommend a broad background of knowledge and skills in the following areas: the political, social, economic and legal context of administration; analytical tools; individual, group and organizational dynamics; policy analysis; administrative/management processes; and arts and science foundation skills. Students are best prepared for an MPA program if their undergraduate programs are multidisciplinary in nature, drawing upon political science, economics, the behavioral sciences, the quantitative sciences, and administrative and managerial sciences.

Law
Most law school admissions committees require a student to have a baccalaureate degree, or equivalent, as well as an acceptable score on
the Law School Admissions Test (LSAT). In general, law schools prefer that a student seek a diverse college education rather than one which is narrowly specialized. They favor thorough learning in some broad cultural field of a student’s choice, such as history, economics, political science, philosophy, mathematics, science, literature, or the classics. Admissions committees rarely favor concentration in specialized, technical curricula unless such study is adequately supplemented by advanced work in the social sciences and humanities. The Law School Admissions Test Council and the Council of the Section on Legal Education and Admissions of the American Bar Association both advise against the taking of satisfactory/unsatisfactory courses by students intending to go to law school.

Advising for pre-law students regardless of major, including application forms for taking the Law School Admissions Test, may be obtained from the Office of Professional School Advising.

**Medicine**

Advising for all pre-health students, including medical and dental students, may be obtained from the Office of Professional School Advising. Students are urged to stop by the office to pick up information on professional schools and talk with an advisor very early in their collegiate career.

**Teacher Certification**

Students majoring in one of the departments of the College of Liberal Arts and working toward a teaching certificate must meet the minimum requirements described in the College of Education and Human Development section under secondary teacher certification. Because many certification requirements are determined by the State of Texas and thus are subject to periodic change, students working toward certification should maintain frequent contact with advisors in the College of Education and Human Development.

**Theology**

The American Association of Theological Schools recommends that students planning to enter a theological seminary include in their undergraduate curriculum the following subjects.

- English (6 semesters)
- History (3 semesters)
- Philosophy (3 semesters)
- Natural science (2 semesters)
- Social science (6 semesters)
- Foreign language (4 semesters): Latin, German or French
- Religion (3 semesters).

Courses taught at Texas A&M in religion include:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Requirement</th>
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<tr>
<td>ENGL 365/360</td>
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<tr>
<td>RELS 360</td>
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<td>HUMA 211/211</td>
<td>Hebrew Scriptures</td>
<td>3</td>
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<td>RELS 211</td>
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<tr>
<td>HUMA 213/213</td>
<td>New Testament</td>
<td>3</td>
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<td>HUMA 304/304</td>
<td>Indian and Oriental Religions</td>
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<td>RELS 304</td>
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<td>PHIL 331/331</td>
<td>Philosophy of Religion</td>
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<td>RELS 331</td>
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</tbody>
</table>

For more information, see the Director of the Religious Studies Program in the college.

**The English Language Institute**

The English Language Institute (ELI) offers a comprehensive program designed to help international students improve their English language ability. The goal of the English Language Institute is to provide the necessary language and cultural skills for international students to enter and participate in academic programs at Texas A&M. This intensive English program facilitates international students’ participation in technology, science and management. Enriched by the arts and humanities, the program serves current and future University students and emphasizes diversity and excellence.

Full-time ELI admitted students receive 25 hours of instruction per week, while part-time admitted students take from 3 to 12 or more hours per week. ELI classes meet on a regular University semester schedule in classrooms on the Texas A&M campus.

The ELI uses the most current textbooks, supplementary materials, language learning equipment and instructional techniques in the field of language learning. Courses emphasize listening and reading comprehension, fluency in speaking and writing, and the development of pronunciation skills, vocabulary and grammar. Courses are offered at beginning (100), intermediate (200), and advanced (300) levels. In addition, 500-level courses in oral skills prepare graduate students to serve as teaching assistants, while 500-level courses in composition teach preparation for thesis and dissertation writing. For more information, contact the ELI Office at (979) 845-7936.

**Majors**

**College of Liberal Arts**

- Bachelor of Arts in Economics, 5-Year Degree Program (p. 440)

**Department of Anthropology**

- Bachelor of Arts in Anthropology, General Track (p. 455)
- Bachelor of Arts in Anthropology, Archaeology Track (p. 427)

**Department of Communication**

- Bachelor of Arts in Communication (p. 430)
- Bachelor of Arts in Telecommunication Media Studies (p. 431)
- Bachelor of Science in Telecommunication Media Studies (p. 432)

**Department of Economics**

- Bachelor of Arts in Economics (p. 437)
- Bachelor of Science in Economics (p. 438)
- Bachelor of Science in Economics and Master of Science in Economics, 5-Year Degree Program (p. 440)
• Bachelor of Arts in Economics (p. 437) and Master of International Affairs, 5-Year Degree Program (p. 439)
• Bachelor of Arts in Economics (p. 437) and Master of Public Service and Administration, 5-Year Degree Program (p. 439)
• Bachelor of Science in Economics (p. 438) and Master of International Affairs, 5-Year Degree Program (p. 441)
• Bachelor of Science in Economics (p. 438) and Master of Public Service and Administration, 5-Year Degree Program (p. 442)

Department of English
• Bachelor of Arts in English (p. 447)
• Bachelor of Arts in English, Middle School Teaching Certification (p. 448)

Department of Hispanic Studies
• Bachelor of Arts in Spanish (p. 451)

Department of History
• Bachelor of Arts in History (p. 455)

Department of International Studies
• Bachelor of Arts in Classics, Classical Civilization Track (p. 456)
• Bachelor of Arts in Classics, Language and Literature Track (p. 457)
• Bachelor of Arts in International Studies, International Commerce Track (p. 458)
• Bachelor of Arts in International Studies, International Communication and Media Track (p. 459)
• Bachelor of Arts in International Studies, International Environmental Studies Track (p. 461)
• Bachelor of Arts in International Studies, International Geographic Information Systems Track (p. 463)
• Bachelor of Arts in International Studies, Global Cultural Studies Track (p. 464)
• Bachelor of Arts in International Studies, International Politics and Diplomacy Track (p. 466)
• Bachelor of Arts in International Studies and Master of Public International Affairs, 5-Year Degree Program (p. 467)
• Bachelor of Arts in Modern Languages, French Option (p. 469)
• Bachelor of Arts in Modern Languages, German Option (p. 470)
• Bachelor of Arts in Modern Language, Russian Option (p. 471)

Department of Performance Studies
• Bachelor of Arts in Music (p. 475)
• Bachelor of Arts in Theatre Arts (p. 476)

Department of Philosophy and Humanities
• Bachelor of Arts in Philosophy (p. 479)

Department of Political Science
• Bachelor of Arts in Political Science (p. 483)
• Bachelor of Science in Political Science (p. 483)
• Bachelor of Arts in Political Science and Master of Public Service and Administration, 5-Year Degree Program (p. 484)
• Bachelor of Science in Political Science and Master of Public Service and Administration, 5-Year Degree Program (p. 484)

Department of Psychology
• Bachelor of Arts in Psychology (p. 492)
• Bachelor of Science in Psychology (p. 492)

Department of Sociology
• Bachelor of Arts in Sociology (p. 495)
• Bachelor of Science in Sociology (p. 496)
• Bachelor of Arts in Sociology and Master of Public Service and Administration, 5-Year Degree Program (p. 497)
• Bachelor of Science in Sociology and Master of Public Service and Administration, 5-Year Degree Program (p. 497)

Minors

College of Liberal Arts
• Africana Studies Minor (p. 417)
• Comparative Cultural Studies-International Minor (p. 418)
• Comparative Cultural Studies-U.S. Minor (p. 419)
• Film Studies Minor (p. 419)
• Global Culture and Society Minor (p. 420)
• Journalism Minor (p. 420)
• Leadership Minor (p. 420)
• Liberal Arts Honors Minor (p. 421)
• Religious Studies Minor (p. 421)
• Women’s Studies Minor (p. 422)

Department of Anthropology
• Anthropology Minor (p. 428)
• Museum Studies Minor (p. 428)

Department of Communication
• Communication Minor (p. 433)

Department of Economics
• Economics Minor (p. 443)

Department of English
• English Minor (p. 449)

Department of Hispanic Studies
• Hispanic Studies for Community Engagement Minor (p. 452)
• Spanish Minor (p. 453)

Department of History
• History Minor (p. 456)

Department of International Studies
• Arabic Studies Minor (p. 472)
• Asian Studies Minor (p. 472)
• Chinese Minor (p. 473)
• Classical Studies Minor (p. 473)
• French Minor (p. 474)
• German Minor (p. 474)
• Italian Minor (p. 474)
Department of Performance Studies
- Music Minor (p. 478)
- Performance Technology Minor (p. 478)
- Theatre Arts Minor (p. 478)

Department of Philosophy
- Philosophy Minor (p. 480)

Department of Psychology
- Psychology Minor (p. 493)

Department of Sociology
- Latino/a and Mexican-American Studies Minor (p. 499)
- Sociology Minor (p. 499)

Certificates

College of Liberal Arts
- Diversity Certificate (p. 423)
- Gender and Leadership Certificate (p. 423)
- Global Perspectives in Liberal Arts Certificate (p. 423)

Department of Communication
- Communication and Global Media Certificate (p. 433)
- Communication Leadership and Conflict Management Certificate (p. 434)
- Health Communication Certificate, Health Campaign/Policy Track (p. 434)
- Health Communication Certificate, Provider-Patient/Organizational Track (p. 435)
- Strategic Communication Certificate (p. 435)

Department of Economics
- Business Economics Certificate (p. 443)
- Quantitative Economic Methods (p. 444)

Department of Political Science
- Advanced Research Methods in Political Sciences Certificate (p. 485)
- Comparative Study of National Politics Certificate (p. 485)
- European Union Politics Certificate (p. 486)
- Foundations of Political Theory Certificate (p. 487)
- International Relations Certificate (p. 488)
- Law, Politics, and Society Certificate (p. 488)
- Race, Ethnicity, and Gender Politics Certificate (p. 489)

Department of Sociology
- Global Sociology Certificate (p. 499)
- Sociology of Gender Certificate (p. 500)
- Sociology of Race and Ethnicity Certificate (p. 500)

Masters

Department of Anthropology
- Master of Arts in Anthropology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/anthropology/ma)
- Master of Science in Maritime Archaeology and Conservation (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/anthropology/maritime-archaeology-conservation-ms)

Department of Communication
- Master of Arts in Communication (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/communication/ma)

Department of Economics
- Master of Science in Economics (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/economics/ms)

Department of English
- Master of Arts in English (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/english/ma)

Department of Hispanic Studies
- Master of Arts in Hispanic Studies (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/hispanic-studies/ma)

Department of History
- Master of Arts in History (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/history/ma)

Department of Performance Studies
- Master of Arts in Performance Studies (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/performance-studies/ma)

Department of Philosophy and Humanities
- Master of Arts in Philosophy (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/philosophy-humanities/ma)

Department of Political Science
- Master of Arts in Political Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/political-science/ma)

Department of Psychology
- Master of Science in Psychology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/psychology/ms)

Department of Sociology
- Master of Science in Sociology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/sociology/ms)

Doctoral

Department of Anthropology
- Doctor of Philosophy in Anthropology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/anthropology/phd)
Department of Communication
• Doctor of Philosophy in Communication (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/communication/phd)

Department of Economics
• Doctor of Philosophy in Economics (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/economics/phd)

Department of English
• Doctor of Philosophy in English (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/english/phd)

Department of Hispanic Studies
• Doctor of Philosophy in Hispanic Studies (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/hispanic-studies/phd)

Department of History
• Doctor of Philosophy in History (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/history/phd)

Department of Philosophy and Humanities
• Doctor of Philosophy in Philosophy (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/philosophy-humanities/phd)

Department of Political Science
• Doctor of Philosophy in Political Science (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/political-science/phd)

Department of Psychology
• Doctor of Philosophy in Clinical Psychology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/psychology/clinical-psychology/phd)
• Doctor of Philosophy in Industrial/Organizational Psychology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/psychology/industrial-organizational-psychology/phd)
• Doctor of Philosophy in Psychology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/psychology/phd)

Department of Sociology
• Doctor of Philosophy in Sociology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/liberal-arts/sociology/phd)

Women’s and Gender Studies - BA
Women’s and Gender Studies is a flexible interdisciplinary program devoted to the critical analysis of gender and the pursuit of knowledge about women throughout history and around the world. Combining the methods and insights of traditional liberal arts disciplines with the special insights of scholarship on women’s and gender studies, our courses yield fresh perspectives on the nature of gender as it intersects with race, ethnicity, class, religion, and nation, and encourage students to look beyond their own culture and era in examining gender’s role in shaping society. Through interdisciplinary breadth and an emphasis on critical thinking, women’s and gender studies prepares students to employ critical learning in their private lives as well as in public roles as citizens and members of a diverse and complex workforce.

Majors in women’s and gender studies receive training in both humanities and social sciences approaches and are required to complete coursework that focuses on material beyond dominant U.S. culture; core courses have both theoretical and applied focuses. In addition, majors pursue a strong liberal arts education and complete a minor in another disciplinary or interdisciplinary area, enhancing career options and enabling students to complement their work in the major and further their educational objectives by gaining detailed knowledge of a second area.

Since gender has far-reaching influence on daily life, world culture, and public policy, this major equips students to enter a wide range of fields. As a liberal arts degree, women’s and gender studies is attractive to employers looking for recruits trained in critical thinking, organizational skills, reading, writing, and presenting in a wide range of subject areas. Expertise in women’s and gender issues is increasingly important to businesses, governmental agencies, and other organizations dealing with matters such as sexual harassment, flex-time, parental leave, and pay equity, just as specialists in women’s and gender studies find opportunities in education, law, health care, social work, counseling, media, public policy, and a wide range of other fields.

Program Requirements

Women’s and Gender Studies Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>WGST 200</td>
<td>Introduction to Women's and Gender Studies</td>
<td>3</td>
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<tr>
<td>WGST 401</td>
<td>Feminist Theory</td>
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<td>WGST 481</td>
<td>Senior Seminar</td>
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<td>WGST humanities electives</td>
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Select from the following:

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<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>WGST 302</td>
<td>Women and Religion</td>
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<td>WGST 330</td>
<td>Women in Ancient Greece and Rome</td>
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<td>WGST 333/ENGL 333</td>
<td>Gay and Lesbian Literature</td>
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<td>WGST 343/FILM 343</td>
<td>Sex, Gender and Cinema</td>
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<td>WGST 374/ENGL 374</td>
<td>Women Writers</td>
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<tr>
<td>WGST 409/PHIL 409</td>
<td>Studies in Gender and Philosophy</td>
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<tr>
<td>WGST 411/COMM 411</td>
<td>Representations of Motherhood</td>
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<td>WGST 422/FREN 422</td>
<td>Studies in Gender and French Literature</td>
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<tr>
<td>WGST 445</td>
<td>Queer Theory</td>
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1 Step 1 Doctoral Program with Texas A&M International University-Corpus Christi and Texas A&M University-Kingsville.
## College of Liberal Arts

### Women and Gender in Italian Literature
452/ITAL 452

### History of American Women
461/HIST 461

### History of Modern American Women
473/HIST 473

### Studies in Women Writers
474/ENGL 474

### Sex and Sexuality in History
476/HIST 476

### Women in Modern European History
477/HIST 477

### Women and Gender in Italian Literature
Women and Gender in Italian Literature

### History of American Women
History of American Women

### History of Modern American Women
History of Modern American Women

### Studies in Women Writers
Studies in Women Writers

### Sex and Sexuality in History
Sex and Sexuality in History

### Women in Modern European History
Women in Modern European History

### Electives

#### Select from the following:

- **WGST 207/SOCI 207** Introduction to Gender and Society
- **WGST 300/PSYC 300** Psychology of Women
- **WGST 307 Gender and Education**
- **WGST 308 Gender and International Education**
- **WGST 309 Feminist Pedagogy**
- **WGST 310/SOCI 310** Motherhood in Society
- **WGST 315/SOCI 315** The Marriage Institution
- **WGST 316/SOCI 316** Sociology of Gender
- **WGST 317/POLS 317** Women in Politics
- **WGST 318/ECON 318** The Economics of Gender and Race
- **WGST 332/SOCI 332** Alternative Genders
- **WGST 334/HLTH 334** Women's Health
- **WGST 367/POLS 367** Women in Government in Comparative Perspective
- **WGST 403 Language and Gender**
- **WGST 404/ANTH 404** Women and Culture

### Women, Minorities and the Mass Media
Women, Minorities and the Mass Media

### Gender and Communication
Gender and Communication

### Women and Work in Society
Women and Work in Society

### Employment Discrimination Law
Employment Discrimination Law

### Gender, Ethnicity and Class in Archaeological Research
Gender, Ethnicity and Class in Archaeological Research

### Women and the Law
Women and the Law

### Gender in Asia
Women in Asia

### Electives

#### Select from the following:

- **WGST 289 Special Topics in...**
- **WGST 291 Research**
- **WGST 391 Studies in Gender and Diversity**
- **WGST 484 Internship in Women's and Gender Studies**
- **WGST 485 Directed Studies**
- **WGST 489 Special Topics in...**

### Minor

#### Select from the following:

- **WGST 289 Special Topics in...**
- **WGST 291 Research**
- **WGST 391 Studies in Gender and Diversity**
- **WGST 484 Internship in Women's and Gender Studies**
- **WGST 485 Directed Studies**
- **WGST 489 Special Topics in...**

### College and University Requirements

#### Communication

- **ENGL 104 Composition and Rhetoric**
- **ENGL 203 Writing about Literature**
- **ENGL 210 Technical and Business Writing**
- **COMM 203 Public Speaking**
- **COMM 243 Argumentation and Debate**

- Literature in English (p. 405)
- Foreign language (p. 405)
- Mathematics (p. 20)
- Life and physical sciences (p. 20)
- Creative arts (p. 22)
- Language, philosophy and culture (p. 21)
- Language, philosophy and culture course or Creative arts course (p. 21)
- Social and behavioral sciences (p. 23)
- Government/political science (p. 23)
- American history (p. 23)
- International and cultural diversity (p. 34)

#### Electives

- 7-10 for 120 total semester credit hours.
Courses may be applied both toward the WGST international and cultural diversity requirement and toward the WGST humanities and/or social sciences requirements.

Only students who are double majoring do not need to complete a minor. See the Minor Requirements section below.

A minimum grade of C is required.

See Literature in English table below for college approved list of courses.

WGST course may not be used to fulfill this requirement.

Completion of four semesters of upper-level ROTC may be substituted for 3 hours of American history or political science.

No more than one course may be in Texas history.

Students are required to complete 6 hours of International and Cultural Diversity courses. These courses may also be used to satisfy other requirements.

Minimum of 7 hours if 18-hour minor; minimum of 10 hours if 15-hour minor.

27 hours of WGST coursework required for the BA degree.

A minimum 2.0 GPR and a minimum grade of C for a course to count in the major. Completion of a minor in another field and completion of distribution requirements in the major as outlined.

At least 12 semester hours in the major must be completed in advanced courses (300- and 400-level), and at least 12 semester hours in the major field must be completed in residence at Texas A&M.

Minor Requirements

All Women's and Gender Studies majors, with the exception of those who are double-majoring, must complete a minor chosen from other departments or divisions within or outside the College of Liberal Arts. The minor will consist of 15–18 hours of coursework with a minimum of 6 hours in residence at the 300- to 400-level. A grade of C or higher is required if a course is to count in the minor. Courses taken toward the minor may also be used to satisfy University Core Curriculum requirements. Students should consult the advisor for the minor or the Undergraduate Student Services Office in the College of Liberal Arts for details about how to satisfy minor requirements.

College and University Requirements

Other courses may qualify. Students should consult the approved lists of courses available in the Undergraduate Student Services Office in the College of Liberal Arts. Students must complete a minimum of 36 hours of 300- or 400-level course work at Texas A&M University.

Literature in English

<table>
<thead>
<tr>
<th>Course Number</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFST 204/ENGL 204</td>
<td>Introduction to African-American Literature</td>
<td>3</td>
</tr>
<tr>
<td>AFST 205/ENGL 205</td>
<td>Introduction to Africana Literature</td>
<td>3</td>
</tr>
<tr>
<td>AFST 329/ENGL 329</td>
<td>African-American Literature Pre-1930</td>
<td>3</td>
</tr>
<tr>
<td>AFST 339/ENGL 339</td>
<td>African-American Literature Post-1930</td>
<td>3</td>
</tr>
<tr>
<td>AFST 379/ENGL 379</td>
<td>Postcolonial Literatures</td>
<td>3</td>
</tr>
<tr>
<td>AFST 393/ENGL 393</td>
<td>Studies in Africana Literature and Culture</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 202</td>
<td>Environmental Literature</td>
<td>3</td>
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<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
<td>3</td>
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<tr>
<td>ENGL 204/AFST 204</td>
<td>Introduction to African-American Literature</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 205/AFST 205</td>
<td>Introduction to Africana Literature</td>
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</tr>
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<td>ENGL 206</td>
<td>Twenty-first Century Literature and Culture</td>
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<tr>
<td>ENGL 212</td>
<td>Shakespeare</td>
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<tr>
<td>ENGL 219</td>
<td>Literature and the Other Arts</td>
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<tr>
<td>ENGL 221/MODL 221</td>
<td>World Literature</td>
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<td>ENGL 222/MODL 222</td>
<td>World Literature</td>
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<tr>
<td>ENGL 227</td>
<td>American Literature: The Beginnings to Civil War</td>
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<tr>
<td>ENGL 227</td>
<td>American Literature: The Beginnings to Civil War</td>
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<tr>
<td>ENGL 231</td>
<td>Survey of English Literature I</td>
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<tr>
<td>ENGL 232</td>
<td>Survey of English Literature II</td>
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<tr>
<td>ENGL 313</td>
<td>Medieval English Literature</td>
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<tr>
<td>ENGL 314</td>
<td>The English Renaissance</td>
<td>3</td>
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<tr>
<td>ENGL 315</td>
<td>Seventeenth-Century Literature</td>
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<td>ENGL 316</td>
<td>Eighteenth-Century Literature and Culture</td>
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<td>ENGL 317</td>
<td>Early British Drama</td>
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<td>ENGL 321</td>
<td>Nineteenth-Century Literature (Romantic)</td>
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<td>ENGL 322</td>
<td>Nineteenth-Century Literature (Victorian)</td>
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<td>ENGL 323</td>
<td>The American Renaissance</td>
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<tr>
<td>ENGL 329/AFST 329</td>
<td>African-American Literature Pre-1930</td>
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<td>ENGL 330</td>
<td>Arthurian Literature</td>
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<td>ENGL 331</td>
<td>Fantasy Literature</td>
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<tr>
<td>ENGL 333/WGST 333</td>
<td>Gay and Lesbian Literature</td>
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<td>ENGL 334</td>
<td>Science Fiction Present and Past</td>
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<td>ENGL 336</td>
<td>Life and Literature of the Southwest</td>
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<td>ENGL 337</td>
<td>Life and Literature of the American South</td>
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<td>ENGL 338</td>
<td>American Ethnic Literature</td>
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<td>ENGL 339/AFST 339</td>
<td>African-American Literature Post-1930</td>
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<td>ENGL 340</td>
<td>Modern and Contemporary Drama</td>
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<td>ENGL 350</td>
<td>Twentieth-Century Literature to World War II</td>
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<td>Literature, World War II to Present.</td>
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<td>ENGL 356/FILM 356</td>
<td>Literature and Film</td>
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<td>ENGL 357</td>
<td>Native American Rhetorics and Literatures</td>
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<td>ENGL 360</td>
<td>Literature for Children</td>
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<td>ENGL 361</td>
<td>Young Adult Literature</td>
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<tr>
<td>ENGL 362/HISP 362</td>
<td>Latino/a Literature</td>
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<td>ENGL 365/RELS 360</td>
<td>The Bible as Literature</td>
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<tr>
<td>ENGL 372</td>
<td>American Poetry</td>
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<td>ENGL 373</td>
<td>American Realism and Naturalism</td>
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<tr>
<td>ENGL 374/WGST 374</td>
<td>Women Writers</td>
<td>3</td>
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<tr>
<td>ENGL 375</td>
<td>Nineteenth-Century American Novel</td>
<td>3</td>
</tr>
</tbody>
</table>
Africana Studies - Minor

The College of Liberal Arts offers a minor in Africana Studies.

An interdisciplinary minor that can be paired easily with any major, Africana Studies is a program which provides students with a unique opportunity to think critically about the cultural, historical and social contributions and experiences of people from Africa and of African descent. In our program, students examine the construction of blackness across ethnic, regional, and national boundaries. Africana Studies courses are a comingling of traditional approaches to the field and cutting edge scholarship that challenges stereotypical portrayals of blacks the world over.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<td>AFST 252/ PHIL 252 Introduction to Hip-Hop Philosophy</td>
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<td>AFST 344/ HIST 344 History of Africa to 1800</td>
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<tr>
<td></td>
<td>AFST 352/ PHIL 352 Africana Philosophy</td>
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<td></td>
<td>AFST 353/ PHIL 353 Radical Black Philosophies of Race and Racism</td>
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<td></td>
<td>AFST 357/ HIST 357 Out of Africa: The Black Diaspora and the Modern World</td>
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<td></td>
<td>AFST 379/ ENGL 379 Postcolonial Literatures</td>
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<td></td>
<td>AFST 391 Africana Feminisms</td>
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<td></td>
<td>AFST 393/ ENGL 393 Studies in Africana Literature and Culture</td>
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<td></td>
<td>AFST 401 Slavery in World History</td>
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<td>AFST 425/ COMM 425 Rhetoric of the Civil Rights Movement</td>
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<td>AFST 485 Directed Studies</td>
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<td>AFST 489 Special Topics in…</td>
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<td></td>
<td>AFST 491 Research</td>
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<tr>
<td></td>
<td>POLS 320 Race and Politics in the United States</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SOCI 319/ SPMT 319 Sociology of Sport</td>
<td></td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours** 18

Students must make a grade of C or better.
Comparative Cultural Studies
International - Minor

The College of Liberal Arts offers a minor in Comparative Cultural Studies (International).

Program Requirements

ANTH 210 Social and Cultural Anthropology 3
or GEOG 202 or Geography of the Global Village
or GEOG 311 or Cultural Geography

Select four of the following: 12

- ECON 320 Economic Development of Europe
- ENGL 340 Modern and Contemporary Drama
- ENGL 350 Twentieth-Century Literature to World War II.
- ENGL 374/ Women Writers
- WGST 374
- FREN 301 French Culture and Civilization
- FREN 336 Contemporary France
- FREN 418 Seminar in French Civilization
- FREN 425/ French Film
- FILM 425
- GEOG 320 The Middle East
- GEOG 323 Geography of Latin America
- GERM 321 German Culture and Civilization I
- GERM 322 German Culture and Civilization II
- GERM 362 The Weimar Republic: Literature and Culture
- HIST 210 Russian Civilization
- HIST 214 History of England
- HIST 335 Europe, 1890-1932
- HIST 336 Europe Since 1932
- HIST 339 Eastern Europe Since 1453
- HIST 342 Latin America Since 1810
- HIST 345/ Modern Africa
- AFST 345
- HIST 346/ History of South Africa
- AFST 346
- HIST 348 Modern Middle East
- HIST 352/ Modern East Asia
- ASIA 352
- HIST 355/ Modern China
- ASIA 355
- HIST 356/ Twentieth Century Japan
- ASIA 356
- HIST 402 Germany Since 1815
- HIST 403 History of Nazi Germany
- HIST 407 History of France Since 1815
- HIST 411 Imperial Russia 1801-1917
- HIST 412 Soviet Union 1917-1991
- HIST 421 European Intellectual History in the Twentieth Century
- HIST 439 Twentieth Century England
- HIST 440 Latin American Cultural and Intellectual History
- HIST 441 History of Mexico, 1821 to the Present
- HIST 477/ Women in Modern European History
- WGST 477
- HUMA 303/RELS 303 Near Eastern Religions
- HUMA 304/RELS 304 Indian and Oriental Religions
- LBAR 331 Studies in European Civilization and Culture I
- LBAR 332 Studies in European Civilization and Culture II
- MGMT 450/IBUS 450 International Environment of Business
- MKTG 401/ Global Marketing
- IBUS 401
- MUSC 300 Topics in Music
- MUSC 312 Music in Modern Western Culture
- MUSC 315 Music in the 20th Century
- MUSC 324/ANTH 324 Music in World Cultures
- PHIL 283 Latin American Philosophy
- PHIL 416 Recent British and American Philosophy
- PHIL 419 Current Continental Philosophy
- POLS 322 Western European Government and Politics
- POLS 323 Political Systems of Latin America
- POLS 324 Politics of Global Inequality
- POLS 338 Government and Politics of the Former Soviet Union
- POLS 365/ Asian Governments and Politics
- ASIA 365
- SOCI 325/ International Business Behavior
- ASIA 325
- SOCI 329/ Pacific Rim Business Behavior
- ASIA 329
- SPAN 320 Introduction to Hispanic Literature
- SPAN 332 Spanish Literature from 1700 to 1936
- SPAN 342 Spanish-American Literature from 1821 to 1935
- SPAN 410 Hispanic Film
- SPAN 411 Contemporary Hispanic Society and Culture
- SPAN 421 Spanish Language Poetry
- SPAN 450 Contemporary Spanish and Spanish-American Literature

Select one of the following in consultation with program coordinator: 3

- ANTH 300 Cultural Change and Development
- ANTH 314 Agrarian Peasant Societies
- ANTH 403/ Anthropology of Religion
- RELS 403
- ANTH 404/ Women and Culture
- WGST 404
- ANTH 426 Anthropology of Food and Nutrition
- COMM 335 Intercultural Communication
- ECON 324 Comparative Economic Systems
- ECON 330 Economic Development
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ECON 418</td>
<td>Economics of Labor</td>
</tr>
<tr>
<td>ENGL 251/</td>
<td>Introduction to Film Analysis</td>
</tr>
<tr>
<td>FILM 251</td>
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</tr>
<tr>
<td>ENGL 352</td>
<td>Literature, World War II to Present.</td>
</tr>
<tr>
<td>HIST 464</td>
<td>International Developments Since 1918</td>
</tr>
<tr>
<td>LING 307</td>
<td>Language and Culture</td>
</tr>
<tr>
<td>PHIL 413</td>
<td>Eighteenth-Century Philosophy</td>
</tr>
<tr>
<td>SOCI 326/</td>
<td>Sociology of Religion</td>
</tr>
<tr>
<td>RELS 326</td>
<td></td>
</tr>
<tr>
<td>SOCI 330</td>
<td>Sociology of Nutrition</td>
</tr>
<tr>
<td>SOCI 424/</td>
<td>Women and Work in Society</td>
</tr>
<tr>
<td>WGST 424</td>
<td></td>
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<tr>
<td></td>
<td><strong>Total Semester Credit Hours</strong> 18</td>
</tr>
</tbody>
</table>

Students must make a grade of "C" or better in all courses.

### Comparative Cultural Studies U.S. - Minor

The College of Liberal Arts offers a minor in Comparative Cultural Studies (U.S.).

**Program Requirements**

Select two of the following: 6

- ENGL 338 American Ethnic Literature
- HIST 319 U.S. Immigration and Ethnicity
- SOCI 317/ Racial and Ethnic Relations
- AFST 317

Select three of the following not already taken: 9

- ENGL 338 American Ethnic Literature
- HIST 319 U.S. Immigration and Ethnicity
- SOCI 317/ Racial and Ethnic Relations
- AFST 317
- ANTH 301 Indians of North America
- COMM 327 American Oratory
- COMM Women, Minorities and the Mass Media
- 407/WGST 407
- COMM Rhetoric of the Civil Rights Movement
- 425/AFST 425
- ENGL 336 Life and Literature of the Southwest
- ENGL 337 Life and Literature of the American South
- ENGL 339/ African-American Literature Post-1930
- AFST 339
- ENGL 340 Modern and Contemporary Drama
- ENGL 350 Twentieth-Century Literature to World War II.
- ENGL 362/ Latino/a Literature
- HISP 362
- ENGL 474/ Studies in Women Writers
- WGST 474
- GEOG 301 Geography of the United States
- HIST 301/ Blacks in the United States Since 1877
- AFST 301
- HIST 305 Mexican-American History 1848-Present
- HIST 307 Latino Communities of the U.S.
- HIST 451 The New South, 1876 to the Present
- HIST 459 American Society and Culture to 1877
- MUSC 200 Topics in Music
- POLS 318 Theories of International Relations
- SOCI 316/ Sociology of Gender
- WGST 316
- SOCI 323/ Sociology of African Americans
- AFST 323
- SOCI 403 Sociology of Latinos
- SPAN 412 Hispanic Writers in the U.S.

Capstone course (selected in consultation with program coordinator) 3

**Total Semester Credit Hours** 18

Students must make a grade of "C" or better in all courses.

### Film Studies - Minor

The Interdisciplinary Minor in Film Studies prepares undergraduate students to think and write critically about film and media from multiple perspectives. The minor offers courses in the history, criticism, and theory of film and media, and provides opportunities to pursue analyses of the aesthetic, cultural, economic, technological, and international dimensions of film. The foundational courses, FILM 251/ENGL 251 and FILM 299, set the stage for advanced courses in Film. A major goal of the program is to connect the student's major field of study with an understanding of film's cultural and social significance. Drawing from the expertise of affiliated faculty across the College of Liberal Arts, the minor can be tailored to the student's interests. The minor culminates in a Senior Seminar involving research on a special topic in the study of film.

**Program Requirements**

- FILM 251/ Introduction to Film Analysis 3
- ENGL 251
- FILM 299 History of Film 3
- FILM 481 Seminar in Film Studies 3
- Select three of the following: 9
  - ENGL 251/ Introduction to Film Analysis
  - WGST 251
  - ENGL 351/ Advanced Film
  - FILM 351
  - ENGL 356/ Literature and Film
  - FILM 356
  - EURO 405/ European Cinema
  - FILM 405
  - FILM 289 Special Topics in...
  - FILM 351/ Advanced Film
  - ENGL 351
  - FILM 394 Studies in Film Genre
  - FILM 401 National Cinema History
  - FILM 405/ European Cinema
  - EURO 405
  - FILM 425/ French Film
  - FREN 425

- **Total Semester Credit Hours** 18

Students must make a grade of "C" or better in all courses.
**Global Culture and Society - Minor**

The College of Liberal Arts offers a minor in Global Culture and Society.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARCH 250</td>
<td>Survey of World Architecture History II</td>
<td>3</td>
</tr>
<tr>
<td>or ANTH 210</td>
<td>Social and Cultural Anthropology</td>
<td></td>
</tr>
<tr>
<td>or GEOG 202</td>
<td>Geography of the Global Village</td>
<td></td>
</tr>
<tr>
<td>ARTS 350</td>
<td>The Arts and Civilization</td>
<td>3</td>
</tr>
<tr>
<td>CARC 311</td>
<td>Field Studies in Design Communication</td>
<td></td>
</tr>
<tr>
<td>CARC 331</td>
<td>Field Studies in Design Philosophy</td>
<td></td>
</tr>
<tr>
<td>HIST 362</td>
<td>History of Science</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 16

1. Portfolio in global culture and society may be completed either during the long semester abroad or upon return to College Station.

2. Must be taken in a single fall or spring semester at a TAMU-affiliated facility such as Santa Chiara or Soltis Center.

Students must make a grade of "C" or better in all courses.

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**Journalism - Minor**

The College of Liberal Arts offers a minor in Journalism.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOUR 200</td>
<td>Mass Media Information</td>
<td>3</td>
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<tr>
<td>JOUR 203</td>
<td>Media Writing I</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 490</td>
<td>Journalism as a Profession</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 484</td>
<td>Internship</td>
<td>3</td>
</tr>
<tr>
<td>COMM 307/</td>
<td>Mass Communication, Law, and Society</td>
<td></td>
</tr>
<tr>
<td>JOUR 301</td>
<td></td>
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</tr>
</tbody>
</table>

Total Semester Credit Hours 18

JOUR 102 is a prerequisite for enrollment in the Journalism minor.

Students must make a grade of "C" or better in all courses.

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**Leadership - Minor**

The College of Liberal Arts offers a minor in Leadership.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 324</td>
<td>Communication Leadership and Conflict Management</td>
<td>3</td>
</tr>
<tr>
<td>PHIL 381</td>
<td>Ethical Theory</td>
<td>3</td>
</tr>
<tr>
<td>POLS 328</td>
<td>Globalization and Democracy</td>
<td>3</td>
</tr>
<tr>
<td>or SOCI 206</td>
<td>Global Social Trends</td>
<td></td>
</tr>
<tr>
<td>HIST 426/</td>
<td>The Ancient Greeks</td>
<td></td>
</tr>
<tr>
<td>CLAS 426</td>
<td></td>
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</tr>
</tbody>
</table>

Total Semester Credit Hours 18

Students must make a grade of "C" or better in all courses.
or HIST 463 or American Foreign Relations
Select one of the following: 3
COMM 335 Intercultural Communication
HIST 343 Inter-American Relations
LBAR 181 First-Year Seminar in the Liberal Arts
PHIL 332 Social and Political Philosophy
POLS 369 Theories of Democracy
SOCI 312 Population and Society
SOCI 404/ RPTS 404 Sociology of the Community

Total Semester Credit Hours 15

Students must make a grade of "C" or better in all courses.

Liberal Arts Honors - Minor

This minor will allow talented students the opportunity to craft a coherent and challenging program by utilizing at least four distinct Liberal Arts disciplines, as well as requiring significant investment in upper-level liberal arts coursework to include research or independent study as a capstone experience.

The minor is designed to ensure that students, in consultation with their honors advisor, will be able to create a minor that will expose them to an intelligent and well-conceived liberal arts experience, giving students a breadth and depth of experience in the liberal arts.

For the vast majority of minors the upper-level requirement is normally 9 hours. This minor requires students to complete 12 hours at the upper level from different departments. That would presuppose a superior acquisition of knowledge already acquired in different disciplines, particularly as many of our 300- and 400-level courses have required prerequisites. The capstone experience of research or independent study ensures that students will be able not only to acquire a better understanding of a cross-disciplinary liberal arts approach, but to apply it in practice as well as theory.

Program Requirements

Minimum of 18 hours of Honors Liberal Arts courses.

At least 12 hours must be at the 300- and 400-level.

3 hours of a capstone 485, 491, or 497 CLLA course. Must be pre-approved by the College Honors Coordinator.

Courses must come from a minimum of four separate CLLA departments or programs.

No grade lower than a B in courses counting toward the minor.

Religious Studies - Minor

The College of Liberal Arts offers an Interdisciplinary Minor in Religious Studies. Students must have a GPA above 2.0 and fewer than 90 hours of completed coursework to declare the minor.

Program Requirements

Comparative Religions

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>RELS 303/</td>
<td>Near Eastern Religions</td>
<td>3</td>
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<tr>
<td>HUMA 303</td>
<td></td>
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<tr>
<td>RELS 304/</td>
<td>Indian and Oriental Religions</td>
<td>3</td>
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<tr>
<td>HUMA 304</td>
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</table>

Select two or four of the following: 6-12

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTH 317/</td>
<td>Introduction to Biblical Archaeology</td>
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<tr>
<td>RELS 317</td>
<td></td>
<td></td>
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<tr>
<td>ANTH 340/</td>
<td>Folklore and the Supernatural</td>
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<tr>
<td>RELS 340</td>
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<tr>
<td>ANTH 403/</td>
<td>Anthropology of Religion</td>
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<tr>
<td>RELS 403</td>
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</tbody>
</table>

COMM 480/ RELS 480 Religious Communication

ENGL 365/ The Bible as Literature

RELS 360

RELS 392/ Studies in Literature, Religion and Culture

GERM 434 Martin Luther and the Reformation in Germany

HISP 364/ Diversity Lessons from Medieval Spain

HIST 220 History of Christianity: Origins to the Reformation

HIST 221/ History of Islam

HIST 221/ History of Islam

HIST 221/ History of Islam

HIST 365/ History of Religion in America to 1860

HIST 366/ History of Religion in America from 1860 to the Present

HIST 418 European Intellectual History from Ancient Greece to the Early Middle Ages

HIST 419/ European Intellectual History from the High Middle Ages to the 17th Century

HUMA 211/RELS 211 Hebrew Scriptures

HUMA 213/RELS 213 New Testament

HUMA 213/RELS 213 New Testament

HUMA 321 Political Islam and Jihad

PSYC 405/ Psychology of Religion

RELS 405

RELS 211/ Hebrew Scriptures

RELS 211/ Hebrew Scriptures

RELS 213/ New Testament

HUMA 213

RELS 220 History of Christianity: Origins to the Reformation

RELS 221/ History of Islam

HIST 221

RELS 302 Women and Religion

RELS 312 Contemplative Practices in the Modern World

RELS 317/ Introduction to Biblical Archaeology

ANTH 317

RELS 321 Political Islam and Jihad
Women's Studies - Minor

The College of Liberal Arts offers a minor in Women's Studies.

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>WGST 200</td>
<td>Introduction to Women’s and Gender Studies</td>
<td>3</td>
</tr>
<tr>
<td>WGST 481</td>
<td>Senior Seminar</td>
<td>3</td>
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<td>Select four of the following:</td>
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<tr>
<td>WGST 289</td>
<td>Special Topics in...</td>
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<td></td>
<td>WGST 291 Research</td>
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<td></td>
<td>WGST 300/PSYC Psychology of Women</td>
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<td>WGST 302 Women and Religion</td>
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<td>WGST 307 Gender and Education</td>
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<td></td>
<td>WGST 308 Gender and International Education</td>
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<td>WGST 309 Feminist Pedagogy</td>
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<td>WGST 315/SOCI The Marriage Institution</td>
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<td>WGST 316/SOCI Sociology of Gender</td>
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<td>WGST 317 Women in Politics</td>
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<td>WGST 32/332 Alternative Genders</td>
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<td>WGST 333/ENGL Gay and Lesbian Literature</td>
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<td>WGST 334/HLTH Women’s Health</td>
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<td></td>
<td>WGST 343/FILM Sex, Gender and Cinema</td>
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<td></td>
<td>WGST 347/ENGL Women Writers</td>
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<td>WGST 349/ANTH Women and Culture</td>
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<td>WGST 401 Feminist Theory</td>
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<td>WGST 407/COMM Women, Minorities and the Mass Media</td>
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<td>WGST 409/PHIL Studies in Gender and Philosophy</td>
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<td>WGST 411 COMM Representations of Motherhood</td>
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</table>

Language electives

May select two of the following:

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<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>CLAS 211</td>
<td>Intermediate Greek</td>
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<tr>
<td>CLAS 221</td>
<td>Intermediate Latin I</td>
</tr>
<tr>
<td>CLAS 222</td>
<td>Intermediate Latin II</td>
</tr>
<tr>
<td>CLAS 311</td>
<td>Advanced Greek: New Testament</td>
</tr>
<tr>
<td>CLAS 312</td>
<td>Advanced Classical Greek Poetry</td>
</tr>
<tr>
<td>CLAS 313</td>
<td>Advanced Classical Greek Prose</td>
</tr>
<tr>
<td>CLAS 321</td>
<td>Advanced Latin Prose</td>
</tr>
<tr>
<td>CLAS 322</td>
<td>Advanced Latin Poetry</td>
</tr>
<tr>
<td>ARAB 201</td>
<td>Intermediate Arabic I</td>
</tr>
<tr>
<td>ARAB 202</td>
<td>Intermediate Arabic II</td>
</tr>
<tr>
<td>ARAB 301</td>
<td>Reading and Composition</td>
</tr>
<tr>
<td>ARAB 302</td>
<td>Reading and Composition II</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 18

1 Up to six semester credit hours may be in approved languages.

Students must make a grade of "C" or better in all courses.

At least 9 semester credit hours must be 300-400 level courses.
WGST 420/COMM 420 Gender and Communication
WGST 424/SOCI 424 Women and Work in Society
WGST 430/MGMT 430 Employment Discrimination Law
WGST 439/ANTH 439 Gender, Ethnicity and Class in Archaeological Research
WGST 461/HIST 461 History of American Women
WGST 462/POLS 462 Women and the Law
WGST 463 Gender in Asia
WGST 473/HIST 473 History of Modern American Women
WGST 474/ENGL 474 Studies in Women Writers
WGST 476/HIST 476 Sex and Sexuality in History
WGST 477/HIST 477 Women in Modern European History
WGST 484 Internship in Women's and Gender Studies
WGST 485 Directed Studies
WGST 489 Special Topics in...
WGST 491 Research

Total Semester Credit Hours 18

Students must make a grade of "C" or better in all courses.

Diversity - Certificate

The Diversity Certificate Program enables students to create, synthesize and integrate academic coursework, co-curricular experience, and service learning engagement to demonstrate their preparedness for participation in the modern global economy and community.

Program Requirements

Students must complete a minimum of twelve hours to include nine hours of diversity related courses from the College of Liberal Arts plus an additional three hours chosen in consultation with the certificate advisers. The additional three hours could consist of a research project, internship, directed study or other option, including a regular approved course. Students will be provided with a sample list of courses and advice about the most appropriate choices for their long term goals. Certificate advisers may approve additional courses not on the sample list to count toward the completion of this requirement. The core courses required for this certificate may also count toward other degree requirements. Students should maintain a GPA of 3.0 in certificate courses.

Certificate Components

1. Orientation Session
2. Academic Component - 12 hours, nine hours from the College of Liberal Arts
3. Co-curricular Component - minimum of 10 hours participation in diversity related co-curricular lectures, presentations and activities.
4. Service Learning Component - consists of 20 hours of involvement in an approved project
5. Capstone Retreat

Gender and Leadership - Certificate

To earn a Gender and Leadership Certificate, a student must complete the Women's Studies minor and fulfill certain non-academic requirements.

Program Requirements

Summary Requirements for the Certificate

• Minor in Women's Studies (18 hours). At least nine hours at the upper division (300 and 400) level.
• A one-year membership in the Aggie Women in Leadership (AWIL) Program or one year of residency in a proposed Women's Leadership Living Learning Community
• Two years of membership in the AWIL Scholars student organization
• Attendance at a minimum of two co-curricular events (lectures, etc.) per semester, excluding summer sessions, during the student's enrollment in the AWIL Scholars program

Global Perspectives in Liberal Arts - Certificate

The global perspectives certificate provides students in the Liberal Arts with a better understanding of our world and their role in it through interactive coursework, research and international experience.

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>LBAR 200</td>
<td>Topics in Liberal Arts I</td>
<td>3</td>
</tr>
<tr>
<td>LBAR 400</td>
<td>Topics in Liberal Arts II</td>
<td>3</td>
</tr>
<tr>
<td>LBAR 400</td>
<td>Topics in Liberal Arts II</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 205</td>
<td>Peoples and Cultures of the World</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 210</td>
<td>Social and Cultural Anthropology</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 324</td>
<td>Music in World Cultures</td>
<td>3</td>
</tr>
<tr>
<td>MUSC 324</td>
<td></td>
<td></td>
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<tr>
<td>ARTS 350</td>
<td>The Arts and Civilization</td>
<td>3</td>
</tr>
<tr>
<td>COMM 335</td>
<td>Intercultural Communication</td>
<td>3</td>
</tr>
<tr>
<td>365/JOUR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMM 438</td>
<td>Propaganda</td>
<td>3</td>
</tr>
<tr>
<td>COMM 440</td>
<td>Political Communication</td>
<td>3</td>
</tr>
</tbody>
</table>
Department of Anthropology

Anthropology is the study of humankind over the entire world and throughout time. With such a broad approach, anthropologists study
existing cultures and human behavior (cultural anthropology), traditions (folklore), prehistoric cultures and lifeways (archaeology), the biological makeup and evolution of humans and non-human primates (biological anthropology), and the origin and nature of language (linguistic anthropology). The study of anthropology promotes an understanding of humankind and provides an introduction to the variety inherent in our biological and cultural heritage. Through the comparative study of the many diverse prehistoric and modern cultures of the world, we have a means of reaching a clearer understanding of ourselves and other people.

Faculty

Alvard, Michael S, Associate Professor
Anthropology
PhD, University of New Mexico, 1993

Athreya, Sheela, Associate Professor
Anthropology
PhD, Washington University in St. Louis, 2003

Bryant, Vaughn M, Professor
Anthropology
PhD, University of Texas, Austin, 1969

Campana, Lilia, Lecturer
Anthropology
PhD, Texas A&M University, 2014

Carlson, David L, Associate Professor
Anthropology
PhD, Northwestern University, 1979

Carlson, Deborah N, Associate Professor
Anthropology
PhD, University of Texas, Austin, 2004

Carlson, Keely B, Lecturer
Anthropology
PhD, Texas A&M University, 2014

Castor, Nicole M, Assistant Professor
Anthropology
PhD, University of Chicago, 2009

Crisman, Kevin J, Professor
Anthropology
PhD, University of Pennsylvania, 1989

De Ruiter, Darryl J, Professor
Anthropology
PhD, University of the Witwatersrand, South Africa, 2001

Goebel, Frank E, Professor
Anthropology
PhD, University of Alaska Fairbanks, 1993

Graf, Kelly E, Assistant Professor
Anthropology
PhD, University of Nevada, Reno, 2008

Green, Thomas A, Associate Professor
Anthropology
PhD, University of Texas, 1974

Gursky, Sharon, Professor
Anthropology
PhD, State University of New York at Stony Brook, 1997

Hamilton, Donny L, Professor
Anthropology
PhD, University of Texas, 1975

Laporte, Catharina M, Lecturer
Anthropology
PhD, Texas A&M University, 2013
MA, Texas A&M University, 2011

Lynch, Darrell W, Lecturer
Anthropology
PhD, University of Tennessee, 2014

Pulak, Cemalettin M, Associate Professor
Anthropology
PhD, Texas A&M University, 1996

Smith, Charles W, Associate Professor
Anthropology
PhD, Texas A&M University, 1995

Thoms, Alston V, Associate Professor
Anthropology
PhD, Washington State University, 1989

Vieira-De-Castro, Luis, Professor
Anthropology
PhD, Texas A&M University, 2001

Wachsmann, Shelley A, Professor
Anthropology
PhD, Institute of Archaeology, Hebrew University, 1991

Warren, Nancy B, Professor
Anthropology
PhD, Indiana University, 1997

Waters, Michael R, Professor
Anthropology
PhD, University of Arizona, The, 1983

Werner, Cynthia A, Associate Professor
Anthropology
PhD, Indiana University, 1997

Winking, Jeffrey W, Associate Professor
Anthropology
PhD, University of New Mexico, 2005

Wright, Lori E, Professor
Anthropology
PhD, University of Chicago, 1994

Majors

- Bachelor of Arts in Anthropology (p. 426)
- Bachelor of Arts in Anthropology, Archaeology Track (p. 427)

Minors
Anthropology - BA

Anthropology majors pursuing the general anthropology track receive foundations in the archaeology, biological anthropology and cultural anthropology subfields of anthropology as well as options to pursue upper-level courses in each of the subfields.

The curriculum leading to a degree in anthropology provides students with the background necessary to pursue graduate studies in anthropology, but is well-rounded and flexible enough to allow students to pursue graduate studies in other disciplines. Employment opportunities include careers in: teaching and research in college, university, museum and foundation settings; administration and research in local, state and federal governments (such as the National Park Service, Bureau of Indian Affairs, National Institute of Health and others); non-governmental organizations and non-profit organizations; foreign service with government agencies (such as the Agency for International Development, United Nations organizations and others); private archaeological research institutions; secondary schools that are adding anthropology to their curricula; and nontraditional opportunities emerging in business and management. Anthropology offers diverse career opportunities and is an expanding and dynamic field that is relevant to many fields of study.

Program Requirements

Anthropology General Track Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTH 202</td>
<td>Introduction to Archaeology</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 210</td>
<td>Social and Cultural Anthropology</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 225</td>
<td>Introduction to Biological Anthropology</td>
<td>4</td>
</tr>
<tr>
<td>&amp; ANTH 226</td>
<td>and Introduction to Biological Anthropology Laboratory</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 410</td>
<td>Anthropological Theory</td>
<td>3</td>
</tr>
<tr>
<td>or ANTH 412</td>
<td>orArchaeological Theory</td>
<td></td>
</tr>
<tr>
<td>Archaeology anthropology course (p. 625)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Biological anthropology course (p. 625)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cultural anthropology course (p. 625)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Anthropology electives (p. 625)</td>
<td>9</td>
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Department Requirement

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 302</td>
<td>Statistical Methods</td>
<td>3</td>
</tr>
<tr>
<td>or STAT 303</td>
<td>or Statistical Methods</td>
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College and University Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
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<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
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<td></td>
</tr>
<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
<td></td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td></td>
</tr>
<tr>
<td>COMM 205</td>
<td>Communication for Technical Professions</td>
<td></td>
</tr>
<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
<td></td>
</tr>
<tr>
<td>Literature in English (p. 405)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Foreign language (p. 405)</td>
<td>14</td>
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<tr>
<td>Mathematics (p. 405)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Life and physical sciences (p. 20)</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Language, philosophy and culture (p. 21)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Writing Courses

All students in each track are required to take two courses with the writing attribute, also known as “W-courses”, from the department. Substitutions with W-courses from other departments are not allowed. Please see the academic advisor for the most current list of Anthropology W-courses.

Minor Requirements

All anthropology majors may select a minor field of study from departments or divisions within or outside the College of Liberal Arts or in a particular area of interest (as with interdisciplinary minors or career opportunity minors). The minor will consist of 15-18 hours or coursework, at least 6 of which must be at the upper-division level. A grade of C or higher is required for a course to count in the minor. No minor must be declared before the student has completed 75 credit hours. Interdisciplinary minors such as women’s and gender studies, classical studies, and religious studies have specific requirements; students should consult the Undergraduate Student Services Office in the College of Liberal Arts for details.

College and University Requirements

Other courses may qualify for this category. Students should consult the approved lists of courses available through the academic advisor in the Department of Anthropology or in the Undergraduate Student Services Office in the College of Liberal Arts. The following list incorporates University Core Curriculum requirements. No course can be counted in more than one category. To promote the opportunity for anthropology majors to acquire a broad educational experience, anthropology students must satisfy their University requirements for language, philosophy and culture, social and behavioral sciences, and the sciences with courses other than those offered by anthropology.

Students must complete a minimum of 36 hours of 300- or 400-level coursework at Texas A&M University.
Anthropology - BA, Archaeology Track

Students who elect to pursue the archaeology track take the foundation courses but also have the opportunity to take multiple upper-level courses which focus on specific topics in archaeology. In addition, majors receive a broad yet rigorous liberal arts education.

The curriculum leading to a degree in anthropology provides students with the background necessary to pursue graduate studies in anthropology, but is well-rounded and flexible enough to allow students to pursue graduate studies in other disciplines. Employment opportunities include careers in: teaching and research in college, university, museum and foundation settings; administration and research in local, state and federal governments (such as the National Park Service, Bureau of Indian Affairs, National Institute of Health and others); non-governmental organizations and non-profit organizations; foreign service with government agencies (such as the Agency for International Development, United Nations organizations and others); private archaeological research institutions; secondary schools that are adding anthropology to their curricula; and nontraditional opportunities emerging in business and management. Anthropology offers diverse career opportunities and is an expanding and dynamic field that is relevant to many fields of study.

Program Requirements

Anthropology Archaeology Track Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ANTH 202</td>
<td>Introduction to Archaeology</td>
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<td>ANTH 210</td>
<td>Social and Cultural Anthropology</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 225</td>
<td>Introduction to Biological Anthropology &amp; Introduction to Biological Anthropology Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>ANTH 316</td>
<td>Nautical Archaeology</td>
<td>3</td>
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<tr>
<td>ANTH 412</td>
<td>Archaeological Theory</td>
<td>3</td>
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<tr>
<td>ANTH 330</td>
<td>Field Research in Anthropology or ANTH 485 or Directed Studies</td>
<td>3</td>
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<tr>
<td>or ANTH 491</td>
<td>or Research</td>
<td></td>
</tr>
<tr>
<td>Anthropology elective (300 or 400 level) (p. 625)</td>
<td>9</td>
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<tr>
<td>Anthropology elective (300 or 400 level) can include archaeology (p. 625)</td>
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Department Requirement

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
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College and University Requirements

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<tbody>
<tr>
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<td>Composition and Rhetoric</td>
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</tr>
<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
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<td>COMM 203</td>
<td>Public Speaking</td>
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<td>COMM 243</td>
<td>Argumentation and Debate</td>
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<td>Literature in English (p. 405)</td>
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<tr>
<td>Mathematics (p. 405)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Life and physical sciences (p. 20)</td>
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<td></td>
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</table>

Writing Courses

All students in each track are required to take two courses with the writing attribute, also known as “W-courses”, from the department. Substitutions with W-courses from other departments are not allowed. Please see the academic advisor for the most current list of Anthropology W-courses.

Minor Requirements

All anthropology majors may select a minor field of study from departments or divisions within or outside the College of Liberal Arts or in a particular area of interest (as with interdisciplinary minors or career opportunity minors). The minor will consist of 15-18 hours of coursework, at least 6 of which must be at the upper-division level. A grade of C or higher is required if a course is to count in the minor. A minor must be declared before the student has completed 75 credit hours. Interdisciplinary minors such as women’s and gender studies, classical studies, and religious studies have specific requirements; students should consult the Undergraduate Student Services Office in the College of Liberal Arts for details.

College and University Requirements

Other courses may qualify for this category. Students should consult the approved lists of courses available through the academic advisor in the Department of Anthropology or the Undergraduate Student Services Office in the College of Liberal Arts. The following list incorporates University Core Curriculum requirements. No course can be counted in more than one category. To promote the opportunity for anthropology majors to acquire a broad educational experience, anthropology students must satisfy their University requirements for language, philosophy and culture, social and behavioral sciences, and the sciences with courses other than those offered by anthropology.

Students must complete a minimum of 36 hours of 300- or 400-level coursework at Texas A&M University.
Anthropology - Minor

The minor in anthropology is offered by the Department of Anthropology. The minor consists of 15 hours of coursework in anthropology, 6 of which must be at the 300-400 level.

Program Requirements

<table>
<thead>
<tr>
<th>Anthropology Requirement I</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select from ANTH 300-499. (p. 625)</td>
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<table>
<thead>
<tr>
<th>Anthropology Requirement II</th>
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<tbody>
<tr>
<td>Select from any ANTH 200-499 course not used above. (p. 625)</td>
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</tbody>
</table>

Total Semester Credit Hours 15

Students must make a grade of "C" or better in all courses.

Museum Studies - Minor

The minor in Museum Studies is offered in cooperation with the College of Liberal Arts, the College of Architecture, and the College of Agriculture and Life Sciences. The increase of collections, curatorial facilities and museums ensures this minor is a wise choice for any student with an interest in Anthropology or related fields. The minor will provide students with a foundational understanding of museum studies while giving them professional experience working in a museum. Coursework includes a minimum of 15 hours, including one core course (3 hours), one internship course (3 hours), and three elective courses (9 hours).

Program Requirements

| ANTH 421 | Museums and Their Functions 3 |
| ANTH 484 | Anthropology Internship 3 |
| Minor Electives | 9 |
| Select from the following: |
| ANTH 313 | Historical Archaeology |
| ANTH 402 | Archaeological Artifact Conservation |
| ANTH 454 | Archaeological Photography |
| ARTS 330 | The Arts of America |
| ARCH 446 | Foundations of Historic Preservation |
| PHIL 330 | Philosophy of Art |
| RPTS 307 | Methods of Environmental Interpretation |
| VIST 465 | Art, Culture and Time Based Media |

Total Semester Credit Hours 15

Minimum of six hours at the 300-400 level.

Students must make a grade of "C" or better in all courses.

Department of Communication

Communication is concerned with one of the most distinctly human characteristics: the use of spoken language to communicate information, maintain social contact, and influence others. Communication is an attractive major because it provides students with a broad liberal arts education, while at the same time focusing on vital communication skills, which are in high demand in the workplace as well as in political, religious and social communities. Communication skills include public speaking, argumentation, technical communication, leading teams and groups to solve problems, interviewing to gather information and to persuade, use and evaluation of communication technology, as well as a thorough array of communication research methods applications.

Degree requirements include the study of rhetorical and communication theories, the study of communication research methods, and the use of those theories and research methods in a variety of communication contexts. Such contexts include health communication, intercultural communication, interpersonal communication, mass media and new communication technologies, organizational communication, political rhetoric, religious communication, and others. Students use their communication skills to become leaders in all areas of business, social and political life.

The career interests of communication majors vary. Some students pursue advanced degrees in communication, law, business, or religion. Others take communication-related positions in strategic communication, public relations, marketing and sales, training and human resources, leadership and management, health fields related to communication, organizations and public policy, communication media, and related areas of business, industry, government, and non-profit organizations. Still others prepare for teaching careers.

Honors Program

The Department of Communication has a well-established Honors plan and strong linkages to the University honors program. Honors courses are available in all areas of Communication. In addition, students may graduate with honors in Communication noted on the transcript. Honor students may also choose individualized instruction through COMM 497, and through honors contracting. Students interested in the Department’s Honors Program should contact the Communication Undergraduate Studies Office.

Undergraduate Courses

The Department of Communication offers courses in many areas of the discipline: Health Communication, Media Studies, Organizational Communication, Rhetoric and Public Affairs, Leadership and Civic Dialogue and Strategic Communication with significant focus in Intercultural and International communication across each area.

Certificates

The Department of Communication offers four certificates. While these certificates are optional, they permit a student to focus studies in one of four areas. The certificates in Communication and Global Media, in Communication Leadership and Conflict Management, and in Health Communication are open to students in the Department of Communication and in any major across the University. The certificate in Strategic Communication is offered to students majoring in Communication or in Telecommunication Media Studies only.

Faculty

Aschenbeck, Stacy H, Lecturer
Department Of Communication
MA, Texas State University, 1999

Barge, James K, Professor
Department Of Communication
PhD, University of Kansas, 1985
Beaudoin, Christopher E, Professor
Department Of Communication
PhD, University of Missouri, 2001

Braman, Sandra, Professor
Department Of Communication
PhD, University of Minnesota, 1974

Burkart, Patrick C, Professor
Department Of Communication
PhD, University of Texas, 2000

Campbell, Heidi A, Associate Professor
Department Of Communication
PhD, University of Edinburgh, 2002

Conrad, Charles R, Professor
Department Of Communication
MS, University of Kansas, 1980
PhD, Kansas University, 1972

Coombs, W. Timothy, Professor
Department Of Communication
PhD, Purdue University, 1990

Crick, Nathan A, Associate Professor
Department Of Communication
PhD, University of Pittsburgh, 2005

Dubriwny, Tasha N, Associate Professor
Department Of Communication
PhD, University of Georgia, 2005

Goidel, Robert K, Professor
Department Of Communication
PhD, University of Kentucky, 1993

Heuman, Joshua M, Instructional Assistant Professor
Department Of Communication
PhD, University of Wisconsin-Madison, 2006

Holladay, Sherry J., Professor
Department Of Communication
PhD, Purdue University, 1992

Hong, Traci J, Associate Professor
Department Of Communication
PhD, University of Southern California, 2002

Jones Barbour, Jennifer L, Instructional Assistant Professor
Department Of Communication
PhD, University of Illinois at Urbana-Champaign, 2006

Kluver, Alan R, Associate Professor
Department Of Communication
PhD, University of Southern California, 1993

May, Matthew S, Assistant Professor
Department Of Communication
PhD, University of Minnesota, 2009

Mercieca, Jennifer R, Associate Professor
Department Of Communication
PhD, University of Illinois at Urbana-Champaign, 2003

Miller, Jeremy R, Lecturer
Department Of Communication
PhD, Texas A&M University, 2012

Poirot, Kristan A, Associate Professor
Department Of Communication
PhD, University of Georgia, 2004

Ramasubramanian, Srividya, Associate Professor
Department Of Communication
PhD, Pennsylvania State University, 2004

Rauscher, Emily A, Assistant Professor
Department Of Communication
PhD, University of Missouri, 2012

Rowe, Sara M, Lecturer
Department Of Communication
MA, Texas A&M University, 2012

Stephenson, Michael, Professor
Department Of Communication
PhD, University of Kentucky, 1999

Street, Nancy A, Instructional Professor
Department Of Communication
MA, University of Texas, 1980

Street, Richard L, Professor
Department Of Communication
PhD, Speech Communication, 1980

Sumpter, Randall S, Associate Professor
Department Of Communication
PhD, University of Texas, 1996

Tarvin, David T, Lecturer
Department Of Communication
PhD, Louisiana State University, 2013

Wallis, Cara J, Associate Professor
Department Of Communication
PhD, University of Southern California, 2008

Waymer, Damion M, Associate Professor
Department Of Communication
PhD, Purdue University, 2006

Wesner, Kyline J, Lecturer
Department Of Communication
MA, Indiana University Purdue University, 2007

**Majors**

- Bachelor of Arts in Communication (p. 430)
- Bachelor of Arts in Telecommunication Media Studies (p. 431)
- Bachelor of Science in Telecommunication Media Studies (p. 432)

**Minors**

- Communication Minor (p. 433)

**Certificates**
Communication - BA

Students who want to transform the world through communication can choose Communication as a major. The Bachelor of Arts in Communication teaches how to influence and persuade others through the use of language, visuals and media. We pursue coursework that gives students a background in the processes and theories of communication as well as in the skills that are so valuable in the working world.

Coursework for incoming Freshmen begins with a dedicated first semester experience which introduces them to the breadth of the field of Communication and Media. We welcome Transfer students, meeting them where they are and integrating them into the Communication family. All Communication majors take a core of required courses that establish a firm foundation in the field and then select additional coursework that suits their interests and needs. Students who wish to focus their studies further, may choose to earn a certificate in Health Communication, Strategic Communication, Leadership and Conflict Management or Global Media.

Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
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<tr>
<td>or COMM 205</td>
<td>Communication for Technical Professions</td>
<td></td>
</tr>
<tr>
<td>or COMM 243</td>
<td>Argumentation and Debate</td>
<td></td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMM 210</td>
<td>Group Communication and Discussion</td>
<td>3</td>
</tr>
<tr>
<td>COMM 215/JOUR</td>
<td>Interviewing: Principles and Practice</td>
<td></td>
</tr>
<tr>
<td>215</td>
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<td></td>
</tr>
<tr>
<td>COMM 230/JOUR</td>
<td>Communication Technology Skills</td>
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<td>230</td>
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<td>COMM 240</td>
<td>Rhetorical Criticism</td>
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<tr>
<td>COMM 250/JOUR</td>
<td>New Media and the Independent Voice</td>
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<tr>
<td>250</td>
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<tr>
<td>COMM 301</td>
<td>Rhetoric in Western Thought 1</td>
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<tr>
<td>COMM 305</td>
<td>Theories of Communication 1</td>
<td>3</td>
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<tr>
<td>COMM 308</td>
<td>Research Methods in Communication 1</td>
<td>3</td>
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<tr>
<td>COMM 300-level</td>
<td>elective (p. 688)</td>
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<tr>
<td>COMM 401-COMM 480 elective (p. 688)</td>
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<tr>
<td>COMM 100-COMM 499 elective (p. 688)</td>
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<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric 3</td>
<td>3</td>
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<tr>
<td>ENGL 203</td>
<td>Writing about Literature 4.5</td>
<td>3</td>
</tr>
<tr>
<td>or ENGL 210</td>
<td>or Technical and Business Writing</td>
<td></td>
</tr>
<tr>
<td>Literature in English (p. 405)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Business Mathematics I</td>
<td>3</td>
</tr>
</tbody>
</table>

or MATH 166 or Topics in Contemporary Mathematics II

Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 131</td>
<td>Mathematical Concepts—Calculus</td>
<td></td>
</tr>
<tr>
<td>MATH 142</td>
<td>Business Mathematics II</td>
<td></td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
<td></td>
</tr>
<tr>
<td>PHIL 240</td>
<td>Introduction to Logic (or higher)</td>
<td></td>
</tr>
<tr>
<td>American history elective (p. 23)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
</tr>
<tr>
<td>Life and physical sciences elective (p. 20)</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Language, philosophy and culture elective (p. 21)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Creative arts elective (p. 22)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Language, philosophy and culture or Creative arts elective (p. 21)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Social and behavioral sciences elective (p. 23)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>International and cultural diversity (p. 34)</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Foreign language (p. 405)</td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>Minor 3,8</td>
<td></td>
<td>15-18</td>
</tr>
<tr>
<td>General electives</td>
<td></td>
<td>0-4</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 120

1. Should be completed by the end of junior year.
2. COMM 101 and COMM 291 are required for incoming freshmen in the First Semester of freshman year.
3. Minimum grade of C required.
4. Course satisfies a writing elective.
5. ENGL 203 will count toward the Communication requirement or the Literature in English requirement, but not both.
6. COMM course may not be used to fulfill this requirement.
7. International and Cultural Diversity courses may also be used to satisfy any other requirement.
8. Sequences approved by the College of Liberal Arts, except Communication. No more than 9 semester credit hours may be at a lower-division (100 and 200) level. A minor must be declared before a student completes 75 semester credit hours.
9. COMM courses may not be used. Maximum of 9 semester credit hours of any combination of military science and physical activity courses.

Included in graduation requirements are the following stipulations:

1. A minimum of 2.0 GPR
2. Minimum grade of C in each course applied to the major
3. Minimum of 12 hours of upper-level COMM coursework at Texas A&M

Teaching Certification

Students desiring certification to teach communication in secondary schools of Texas may either major in communication (College of Liberal Arts) or in another field, but in either case, they must include the following courses in their degree plans:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>COMM 210</td>
<td>Group Communication and Discussion</td>
<td>3</td>
</tr>
<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
<td>3</td>
</tr>
<tr>
<td>COMM 301</td>
<td>Rhetoric in Western Thought</td>
<td>3</td>
</tr>
</tbody>
</table>
Telecommunication Media Studies - BA

Telecommunication Media Studies focuses on media industries, technologies, and communication systems in cultural and historical contexts, their audience processes and effects, and social implications of the media.

The Telecommunication Media Studies major provides students with tools for understanding the media and their roles in social life theoretically, historically and critically. The degree allows students to choose a broadly based communication and media studies major or a more specialized study of telecommunication and information systems. Students can choose Communication courses that address media industries, law and policy, technology and society, media audiences, processes, and effects, and the theory, history, and criticism of media, culture, and communication.

A degree in Telecommunication Media Studies may be useful in a broad variety of careers, from media and telecommunication industries, through communication-related positions in business, government, or non-profit organizations, to higher education. The curriculum is designed to educate citizens for a productive future in a changing world. Our students may become industry leaders, government regulators, spokespeople, politicians, writers, artists, activists, and informed citizens.

The BA and BS are both available. The BA is a more flexible, liberal arts media-oriented degree.

Program Requirements

Core Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 230/</td>
<td>Communication Technology Skills</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 230</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMM 308</td>
<td>Research Methods in Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 330</td>
<td>Technology and Human Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 350</td>
<td>Theories of Mediated Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 360</td>
<td>Cultural History of the Media</td>
<td>3</td>
</tr>
<tr>
<td>COMM 401-COMM 480 (p. 688)</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

Telecommunications Electives

Select four of the following: 12

- COMM 101-COMM 499 (p. 688)
- CSCE 110 Programming I
- CSCE 206 Structured Programming in C

Additional education courses are required. More complete information on the requirements for teacher certification may be found in the College of Education and Human Development section under secondary teacher certification.

College and University Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following: 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
<td>2</td>
</tr>
<tr>
<td>ENGL 301</td>
<td>Technical and Business Writing</td>
<td></td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td></td>
</tr>
<tr>
<td>COMM 205</td>
<td>Communication for Technical Professions</td>
<td></td>
</tr>
<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
<td></td>
</tr>
</tbody>
</table>

Foreign language (p. 405) 14

MATH 141 Business Mathematics I 3
MATH 166 or Topics in Contemporary Mathematics II 3
Select one of the following: 3

MATH 131 Mathematical Concepts—Calculus 3
MATH 142 Business Mathematics II 3
MATH 151 Engineering Mathematics I 3
PHIL 240 Introduction to Logic (or higher) 3

Life and physical sciences elective (p. 20) 9
Language, philosophy and culture elective (p. 21) 3
Creative arts elective (p. 22) 3
Language, philosophy and culture or creative arts elective (p. 21) 3
ECON 202 Principles of Economics 3
Social and behavioral sciences elective (p. 23) 3
American history elective (p. 23) 6
POLS 206 American National Government 3
POLS 207 State and Local Government 3
International and cultural diversity (p. 34) 4

Minor 5 15-18

General Electives 3

Total Semester Credit Hours 120
1. COMM 203 and COMM 243 cannot be taken as electives. Courses in the Core Requirements not selected to meet those requirements may be selected as electives. At least 6 semester credit hours must be chosen from COMM Writing Intensive courses.

2. ENGL 203 will count toward the Communication requirement or the Literature in English requirement, but not both.

3. COMM course may not be used to fulfill this requirement

4. Courses may also be used to satisfy any other requirement.

5. Sequences approved by the College of Liberal Arts, except Communications. No more than 9 semester credit hours may be at a lower-division (100 and 200) level. A minor must be declared before a student completes 75 semester credit hours. Minimum grade of C is required.

6. Maximum of 9 semester credit hours of any combination of military science and physical activity courses.

Students take 21 credit hours of the required program core courses and 12 credit hours of telecommunication elective courses for a total of 33 credit hours. At least 12 credits must be at the upper-division level. At least 12 credits must be taken in residence at Texas A&M University. Minimum grade of C in each course. No more than 3 credit hours of COMM 484; no more than 3 credit hours of COMM 485.

Teaching Certification

Students desiring certification to teach communication in secondary schools of Texas may either major in communication (College of Liberal Arts) or in another field, but in either case, they must include the following courses in their degree plans:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>COMM 210</td>
<td>Group Communication and Discussion</td>
<td>3</td>
</tr>
<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
<td>3</td>
</tr>
<tr>
<td>COMM 301</td>
<td>Rhetoric in Western Thought</td>
<td>3</td>
</tr>
<tr>
<td>COMM 305</td>
<td>Theories of Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 315</td>
<td>Interpersonal Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 350</td>
<td>Theories of Mediated Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 330</td>
<td>Technology and Human Communication</td>
<td>3</td>
</tr>
<tr>
<td>or COMM 340</td>
<td>Communication and Popular Culture</td>
<td>3</td>
</tr>
<tr>
<td>or COMM 435</td>
<td>Rhetoric of Television and Film</td>
<td>3</td>
</tr>
<tr>
<td>THAR 407</td>
<td>Performing Literature</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours: 27

Additional education courses are required. More complete information on the requirements for teacher certification may be found in the College of Education and Human Development section under secondary teacher certification.

Telecommunication Media Studies - BS

Telecommunication Media Studies focuses on media industries, technologies, and communication systems in cultural and historical contexts, their audience processes and effects, and social implications of the media.

The Telecommunication Media Studies major provides students with tools for understanding the media and their roles in social life theoretically, historically and critically. The degree allows students to choose a broadly based communication and media studies major or a more specialized study of telecommunication and information systems. Students can choose Communication courses that address media industries, law and policy, technology and society, media audiences, processes, and effects, and the theory, history, and criticism of media, culture, and communication.

A degree in Telecommunication Media Studies may be useful in a broad variety of careers, from media and telecommunication industries, through communication-related positions in business, government, or nonprofit organizations, to higher education. The curriculum is designed to educate citizens for a productive future in a changing world. Our students may become industry leaders, government regulators, spokespeople, politicians, writers, artists, activists, and informed citizens.

The BA and BS are both available. The BS is more directed and requires a quantitative background.

Program Requirements

Core Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 230/</td>
<td>Communication Technology Skills</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 230</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMM 307/</td>
<td>Mass Communication, Law, and Society</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 301</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or COMM 354</td>
<td>or Political Economy of Telecommunication</td>
<td></td>
</tr>
<tr>
<td>or COMM 330</td>
<td>Technology and Human Communication</td>
<td>3</td>
</tr>
<tr>
<td>or COMM 345</td>
<td>Media Industries</td>
<td>3</td>
</tr>
<tr>
<td>or COMM 350</td>
<td>Theories of Mediated Communication</td>
<td>3</td>
</tr>
<tr>
<td>or COMM 375</td>
<td>Media Audiences</td>
<td>3</td>
</tr>
<tr>
<td>COMM 400-COMM 480 (p. 688)</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

Telecommunications Electives

Select three of the following: 9

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 100-COMM 499 (p. 688)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSCE 110</td>
<td>Programming I</td>
<td></td>
</tr>
<tr>
<td>CSCE 206</td>
<td>Structured Programming in C</td>
<td></td>
</tr>
<tr>
<td>ISYS 250</td>
<td>Business Programming Logic and Design</td>
<td></td>
</tr>
<tr>
<td>ISYS 310</td>
<td>Network Communications and Infrastructure</td>
<td></td>
</tr>
<tr>
<td>ISYS 315</td>
<td>Database Programming</td>
<td></td>
</tr>
<tr>
<td>ISYS 325</td>
<td>Business Object Oriented Programming with Java</td>
<td></td>
</tr>
<tr>
<td>ISYS 425</td>
<td>Complex Business Application Design</td>
<td></td>
</tr>
<tr>
<td>JOUR 102</td>
<td>American Mass Media</td>
<td></td>
</tr>
<tr>
<td>JOUR 301/</td>
<td>Mass Communication, Law and Society</td>
<td></td>
</tr>
<tr>
<td>COMM 307</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MGMT 209</td>
<td>Business, Government and Society</td>
<td></td>
</tr>
<tr>
<td>MGMT 309</td>
<td>Survey of Management</td>
<td></td>
</tr>
<tr>
<td>TCMG 274</td>
<td>Distance Networking for Training and Development</td>
<td></td>
</tr>
<tr>
<td>WGST 407/COMM 407</td>
<td>Women, Minorities and the Mass Media</td>
<td></td>
</tr>
</tbody>
</table>

College and University Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following: 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
<td></td>
</tr>
<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
<td></td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td></td>
</tr>
</tbody>
</table>
Teaching Certification

Students desiring certification to teach communication in secondary schools of Texas may either major in communication (College of Liberal Arts) or in another field, but in either case, they must include the following courses in their degree plans:

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<th>Title</th>
<th>Credit Hours</th>
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<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>COMM 210</td>
<td>Group Communication and Discussion</td>
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<td>COMM 243</td>
<td>Argumentation and Debate</td>
<td>3</td>
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<td>COMM 301</td>
<td>Rhetoric in Western Thought</td>
<td>3</td>
</tr>
<tr>
<td>COMM 305</td>
<td>Theories of Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 315</td>
<td>Interpersonal Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 350</td>
<td>Theories of Mediated Communication</td>
<td>3</td>
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<td>COMM 330</td>
<td>Technology and Human Communication</td>
<td>3</td>
</tr>
<tr>
<td>or COMM 340</td>
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<tr>
<td>or COMM 435</td>
<td>Rhetoric of Television and Film</td>
<td></td>
</tr>
<tr>
<td>THAR 407</td>
<td>Performing Literature</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours: 27

Additional education courses are required. More complete information on the requirements for teacher certification may be found in the College of Education and Human Development section under secondary teacher certification.

Communication - Minor

The minor in Communication is offered by the Department of Communication. Communication is central to the pursuit of any field of study and to the mastery of the future for societies, commerce, cultures, relationships and the individual. All majors are welcome as Communication minors.

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 200 level course</td>
<td>(p. 688)</td>
<td>3</td>
</tr>
<tr>
<td>COMM 301</td>
<td>Rhetoric in Western Thought</td>
<td>3</td>
</tr>
<tr>
<td>or COMM 305</td>
<td>Theories of Communication</td>
<td></td>
</tr>
<tr>
<td>COMM 300-COMM 499</td>
<td>(p. 688)</td>
<td>6</td>
</tr>
<tr>
<td>COMM 200-COMM 499</td>
<td>(p. 688)</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours: 15

Students must earn a grade of C or better in each course.

Communication and Global Media - Certificate

The Communication and Global Media Certificate (CGMC), is offered by the Department of Communication, and is designed to provide students with an understanding of a communication perspective on the impact of media in a global context. Media and communication sectors are the second largest export markets for the US, after defense and aerospace. The rise of the BRIC (Brazil, Russia, India, China, Indonesia) economies and the desire of businesses to capitalize on the growth of these markets is a prime example of the application of this certificate. The CGMC prepares students for understanding the growth and impact of communication and global media in a variety of similar contexts. Specific certificate requirements are available in the Office of Undergraduate Advising of the Department of Communication. Details are also available...
on the Department of Communication (http://communication.tamu.edu) website.

**Program Requirements**

The CGMC requires designated courses and completion of a global internship or approved experience. Students must earn a grade of “B” or better in each course used to meet the requirements. Students who pursue the CGMC must complete all requirements prior to graduation.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 335</td>
<td>Intercultural Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 365/</td>
<td>International Communication</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 365</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMM 458/</td>
<td>Global Media</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 458</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Select two of the following:

- COMM 330 Technology and Human Communication
- COMM 345 Media Industries
- COMM 354 Political Economy of Telecommunication
- COMM 375 Media Audiences
- COMM 452 Cultural Studies of Communication Technology
- Other courses approved by CGMC committee for prescribed electives.

**Health Communication - Certificate, Health Campaign/Policy Track**

Careers in Health and in Communication are growing much faster than average according to the Office of Occupational Outlook, Bureau of Labor Statistics. Health communication skills are increasingly valuable in careers related to health and medicine, as well as the media, public relations, and strategic communication. Health communication skills are applicable for a variety of health and medical career tasks including provider-patient consultations; the formative research, design, implementation, and assessment of public health communication campaigns; the development of strategic communication initiatives for health organizations and related products and services; as well as leadership in public and private sector health agendas. Health messaging reaches diverse audiences and includes the use of advocacy to influence policy, as well as mediating and shaping public conversations on health issues both face-to-face and via traditional and new media in local and global arenas. Health communication skills are important for profit, nonprofit, and governmental organizations.

The Health Communication Certificate (HCC) provides a track for students interested in health campaigns, other forms of mediated health communication, and health policy. Specific certificate requirements are available in the Undergraduate Studies Office of the Department of Communication. Details are also available on the Department of Communication (http://communication.tamu.edu) website.

**Program Requirements**

Students must earn a grade of “B” or better in each course used to meet the requirements. Students who pursue the HCC must complete all requirements prior to graduation.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 370</td>
<td>Health Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 470</td>
<td>Communication in Health Care Contexts</td>
<td>3</td>
</tr>
<tr>
<td>COMM 471</td>
<td>Media, Health and Medicine</td>
<td>3</td>
</tr>
</tbody>
</table>

**Prescribed Elective Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 375</td>
<td>Media Audiences</td>
<td>3</td>
</tr>
<tr>
<td>COMM 450</td>
<td>Media Campaigns</td>
<td>3</td>
</tr>
<tr>
<td>COMM 325</td>
<td>Persuasion</td>
<td>3</td>
</tr>
<tr>
<td>or COMM 330</td>
<td>Technology and Human Communication</td>
<td>3</td>
</tr>
</tbody>
</table>

One semester or one summer of service learning

**Total Semester Credit Hours**

<table>
<thead>
<tr>
<th>Total Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
</tr>
</tbody>
</table>
Health Communication - Certificate, Provider-Patient/ Organizational Track

Careers in Health and in Communication are growing much faster than average according to the Office of Occupational Outlook, Bureau of Labor Statistics. Health communication skills are increasingly valuable in careers related to health and medicine, as well as the media, public relations, and strategic communication. Health communication skills are applicable for a variety of health and medical career tasks including provider-patient consultations; the formative research, design, implementation, and assessment of public health communication campaigns; the development of strategic communication initiatives for health organizations and related products and services; as well as leadership in public and private sector health agendas. Health messaging reaches diverse audiences and includes the use of advocacy to influence policy, as well as mediating and shaping public conversations on health issues both face-to-face and via traditional and new media in local and global arenas. Health communication skills are important for profit, nonprofit, and governmental organizations.

This Health Communication Certificate (HCC) provides a track for students interested in communication in healthcare organizations and provider-patient relationships. Specific certificate requirements are available in the Undergraduate Studies Office of the Department of Communication. Details are also available on the Department of Communication (http://communication.tamu.edu) website.

Program Requirements

Students must earn a grade of “B” or better in each course used to meet the requirements. Students who pursue the HCC must complete all requirements prior to graduation.

<table>
<thead>
<tr>
<th>Required Courses</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 370 Health Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 470 Communication in Health Care Contexts</td>
<td>3</td>
</tr>
<tr>
<td>COMM 471 Media, Health and Medicine (COMM 470 may be taken in place of COMM 471)</td>
<td>3</td>
</tr>
<tr>
<td>Prescribed Elective Courses</td>
<td></td>
</tr>
<tr>
<td>COMM 315 Interpersonal Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 320 Organizational Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 335 Intercultural Communication</td>
<td>3</td>
</tr>
<tr>
<td>or COMM 324 or Communication Leadership and Conflict Management</td>
<td></td>
</tr>
<tr>
<td>or COMM 443 or Communication and Conflict</td>
<td></td>
</tr>
<tr>
<td>One semester or one summer of service learning</td>
<td>0</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 18

1 Working with nonprofit on health promotion or health campaigns for 5 hours per week for a minimum of 10 weeks. Must be approved in advance by the Director of Undergraduate Studies.

Strategic Communication - Certificate

Strategic communication is the process that supports public relations, promotions, public information, marketing, corporate communication and advertising. Strategic communication is creation of the plan as well as the tools or tactics used to implement that plan effectively. The value of effective strategic communication is acknowledged by both profit and nonprofit corporations and by governmental agencies. The effect of strategic communication failures on the bottom line, on employee and stakeholder satisfaction, and on the efficient use of resources, is well documented. Gathering and interpreting appropriate information, audience analysis, as well as harnessing the power of accurate language in message crafting, are further noted as key strategic communication functions. Tactics available for implementing strategic communication are expanding exponentially as digital communication and new media evolve. Mastery of the integration of these tactics in strategic plans augment the effectiveness of internal and public issues management while mitigating corporate frustration, offensive messages, and overspending. Although effective strategic communication is critical to organizational success, many companies and agencies continue to need support and assistance in this arena. The U.S. Department of Labor Occupational Outlook Handbook notes that careers in various strategic communication areas are growing “faster than average” to “much faster than average.” The Certificate in Strategic Communication will prepare Communication and Telecommunication Media Studies majors to plan and execute communication strategically and to coordinate the integration of appropriate tactics to enhance commerce, government, and to further political, religious and social goals, as they lead us into the future. Specific certificate requirements are available in the Undergraduate Studies Office of the Department of Communication. Details are also available on the Department of Communication (http://communication.tamu.edu) website.

Program Requirements

Students must earn a grade of “B” or better in each course used to meet the requirements. Students who pursue the SCC must complete all requirements prior to graduation.

<table>
<thead>
<tr>
<th>Required Courses</th>
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</thead>
<tbody>
<tr>
<td>COMM 322 Communication Tactics</td>
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<tr>
<td>COMM 323 Strategic Communication</td>
<td>3</td>
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<tr>
<td>COMM 325 Persuasion</td>
<td>3</td>
</tr>
<tr>
<td>COMM 375 Media Audiences</td>
<td>3</td>
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<tr>
<td>COMM 321 Strategic Communication Case Studies</td>
<td>3</td>
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<tr>
<td>Prescribed Elective Courses</td>
<td></td>
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<tr>
<td>Select one of the following:</td>
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<tr>
<td>COMM 320 Organizational Communication</td>
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<tr>
<td>COMM 438 Propaganda</td>
<td></td>
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<tr>
<td>COMM 440 Political Communication</td>
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</tr>
<tr>
<td>COMM 446 Communication, Organizations and Society</td>
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</tr>
<tr>
<td>COMM 449 Activism and Communication</td>
<td></td>
</tr>
<tr>
<td>COMM 450 Media Campaigns</td>
<td></td>
</tr>
<tr>
<td>Other courses approved by SCC committee for prescribed electives</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 18
Students will be required to complete a semester-long strategic communication service-learning experience with a nonprofit as part of COMM 321. Coursework will involve production of a portfolio documenting the strategic communication initiative.

Department of Economics

The study of economics helps students develop a framework for understanding of how individuals, organizations and societies make choices and how those choices interact to determine the allocation of an economy's limited resources among alternative competing uses. Economists study how these choices are made in a variety of environments and consider how the outcomes vary under alternative forms of economic organization. Economists evaluate the outcomes of an economic system on a scorecard that includes several different criteria such as efficiency, equity, and stability.

The fundamental goal of our curriculum is to introduce students to the economic way of thinking—a particular way of asking questions and analyzing problems. We offer a core set of courses that teach the fundamental theoretical tools of economics, and a set of elective courses that demonstrate how economists apply these tools to study a wide variety of real-world economic issues. A key takeaway for students is a working knowledge of a useful and coherent structural approach to examining current public policy issues and an ability to identify the inherent tradeoffs involved in developing solutions to major social problems.

The economic style of thinking, when combined with training in the required tools of quantitative and qualitative analysis, provides students with a skill set that will serve them well in a wide array of post-graduate pursuits. The banking and financial sectors regularly hire undergraduate economics majors as do management consulting firms. A number of private corporations employ economists to prepare forecasts of future movements in firm costs and profits. Government agencies—local, state, national, international- hire economics majors for positions as budget analysts or government program evaluators. The study of economics also provides sound preparation for graduate school, either a Masters or PhD degree in economics or a professional degree in business, law, or public policy.

Faculty

An, Yonghong, Assistant Professor
Economics
PhD, John Hopkins University, 2011

Anderson, Richard K, Professor
Economics
PhD, Purdue University, 1976

Barr, Andrew, Assistant Professor
Economics
PhD, University of Virginia, 2015

Bento, Pedro, Assistant Professor
Economics
PhD, University of Toronto, 2013

Brown, Alexander L, Associate Professor
Economics
PhD, California Institute of Technology, 2008

Eckel, Catherine C, Professor
Economics
PhD, University of Virginia, 1983

Edwardson, Jeffrey C, Senior Lecturer
Economics
PhD, Texas A&M University, 2000

Fragiadakis, Daniel, Assistant Professor
Economics
PhD, Stanford University, 2014

Gan, Li, Professor
Economics
PhD, University of California, Berkeley, 1998

Glass, Amy J, Associate Professor
Economics
PhD, University of Pennsylvania, 1993

Gronberg, Timothy J, Professor
Economics
PhD, Northwestern University, 1978

Hanson, John R, Professor
Economics
PhD, University of Pennsylvania, 1972

Hoekstra, Mark L, Associate Professor
Economics
PhD, University of Florida, 2006

Hwang, Haeshin, Professor
Economics
PhD, University of Minnesota, 1976

Jansen, Dennis W, Professor
Economics
PhD, University of North Carolina at Chapel Hill, 1983

Krasteva, Silvana S, Assistant Professor
Economics
PhD, Duke University, 2009

Li, Qi, Professor
Economics
PhD, Texas A&M University, 1991

Lindo, Jason M, Associate Professor
Economics
PhD, University of California, Davis, 2009

Luco Echeverria, Fernando A, Assistant Professor
Economics
PhD, Northwestern University, 2014

Maness, Robert S, Visiting Associate Professor
Economics
PhD, Texas A&M University, 1992

Manjunath, Vikram, Assistant Professor
Economics
PhD, University of Rochester, 2011
Majors

• Bachelor of Arts in Economics (p. 437)
• Bachelor of Science in Economics (p. 438)

5-Year Degree Programs

• Bachelor of Arts in Economics and Master of International Affairs (p. 439)
• Bachelor of Arts in Economics and Master of Public Service and Administration (p. 439)
• Bachelor of Science in Economics and Master of Science in Economics (p. 440)
• Bachelor of Science in Economics and Master of International Affairs (p. 441)
• Bachelor of Science in Economics and Master of Public Service and Administration (p. 442)

Minors

• Economics Minor (p. 443)

Certificates

• Business Economics Certificate (p. 443)
• Quantitative Economics Methods (p. 444)

Economics - BA

The Bachelor of Arts in Economics degree teaches students analytical thinking skills and their applications to better understand human behavior. The degree plan is designed to allow opportunities for applied exploration of economic principles and theory through research, internship, and study abroad opportunities while focusing on foreign language and the development of rational thought and critical thinking. At the completion of the degree, students are prepared for a wide variety of post-graduate options including: international business, law school, government and public policy professions, and non-profit organizations.

Program Requirements

Core Requirements

ECON 202 Principles of Economics 3
ECON 203 Principles of Economics 3
ECON 323 Microeconomic Theory 3
ECON 410 Macroeconomic Theory 3
Economics electives (p. 737) 1 21
ACCT 209 Survey of Accounting Principles 3

College and University Requirements 2

ENGL 104 Composition and Rhetoric 3
Select one of the following: 3
ENGL 203 Writing about Literature
ENGL 210 Technical and Business Writing
COMM 203 Public Speaking
COMM 205 Communication for Technical Professions
COMM 243 Argumentation and Debate

Literature in English (p. 405) 6
Foreign Language (p. 405) 3 14
MATH 141 Business Mathematics I 3
or MATH 166 or Topics in Contemporary Mathematics II
Select one of the following: 3
MATH 131 Mathematical Concepts—Calculus
MATH 151 Engineering Mathematics I
Economics - BS

The Bachelor of Science in Economics degree teaches students analytical thinking skills and their applications to better understand human behavior. The degree plan is designed to allow opportunities for applied exploration of economic principles and theory through research, internship, and study abroad while focusing on quantitative skills and the development of rational thought and critical thinking. At the completion of the degree, students are prepared for a wide variety of post-graduate opportunities including: financial and banking careers, actuarial science, graduate school in social science and law, and government, public policy and political professions.

Program Requirements

Core Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 202</td>
<td>Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 203</td>
<td>Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 323</td>
<td>Microeconomic Theory</td>
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<td>ECON 410</td>
<td>Macroeconomic Theory</td>
<td>3</td>
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Economics electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>ECON 322</td>
<td>May not be applied toward the major.</td>
<td></td>
</tr>
<tr>
<td>ACCT 209</td>
<td>Survey of Accounting Principles</td>
<td>3</td>
</tr>
<tr>
<td>ACCT 210</td>
<td>Survey of Managerial and Cost Accounting Principles</td>
<td>3</td>
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College and University Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
<td>3</td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>COMM 205</td>
<td>Communication for Technical Professions</td>
<td>3</td>
</tr>
<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours: 120

1. ECON 322 may not be applied toward the major.
2. Must make a grade of C or better.
3. Other courses may qualify. Students should consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts. No course can be counted in more than one category.
4. ECON 100-ECON 499 (p. 737) and ECMT 100-ECMT 499 (p. 736) may not be used to fulfill this requirement.
5. 6 required hours. These courses may also be used to satisfy any other requirement.
6. The student may select any courses other than economics courses and ENGL 103 as free electives. No more than 11 credits of any combination of military, air or naval science and physical activity will be allowed to count as electives. Students may also use up to 12 hours of free electives to pursue a minor.

1. ECON 322 may not be applied toward the major.
2. Must make a grade of C or better.
3. Other courses may qualify. Students should consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts. No course can be counted in more than one category.
4. ECON 100-ECON 499 (p. 737) and ECMT 100-ECMT 499 (p. 736) may not be used to fulfill this requirement.
5. 6 required hours. These courses may also be used to satisfy any other requirement.
6. The student may select any courses other than economics courses and ENGL 103 as free electives. No more than 11 credits of any combination of military, air or naval science and physical activity will be allowed to count as electives. Students may also use up to 18 hours of free electives to pursue a minor.
Total of 33 credits. No more than 39 credits in economics and econometrics can be applied to this degree. A grade of C or higher is required for a course to be counted in the major field.

**Economics - 5-Year Bachelor of Arts/Master of International Affairs**

The Joint-Degree Program between the Department of Economics and The Bush School of Government & Public Service allows undergraduate Economics students to enter the Master of International Affairs Program, with a focus in International Economics and Development, at the beginning of their fourth year at Texas A&M University. This program combines the teaching of analytical thinking skills and applications to better understand human behavior as it relates to international economic development along with skills in diplomacy, research, and development of a global perspective.

Students will be required to complete the same two-year, 48-hour curriculum as other students admitted to the Bush School’s MPIA program. Students will double-count 9 hours of Bush School courses toward the undergraduate major coursework area and up to 9 hours toward general electives in the Bachelor of Arts in Economics. At the completion of the joint degree, students are prepared for a wide variety of post-graduate opportunities including: employment in global commerce, government, government contracting, national security, and transfer pricing.

Students interested in this program will apply during the fall of their junior year and, if admitted, begin taking masters-level courses in the fall of their senior year with an undergraduate classification. Students are reclassified as degree seeking master’s students upon completing 96 credit hours, typically in the following semester. These credit hours must include all specific course prerequisites for a baccalaureate degree in Economics, as well as the courses required by the College of Liberal Arts and by Texas A&M University for an undergraduate degree.

### Program Requirements

**Core Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
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<td>ECON 202</td>
<td>Principles of Economics</td>
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<tr>
<td>ECON 203</td>
<td>Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 323</td>
<td>Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 410</td>
<td>Macroeconomic Theory</td>
<td>3</td>
</tr>
<tr>
<td>Economics electives (p. 737)</td>
<td></td>
<td>21</td>
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<tr>
<td>ACCT 209</td>
<td>Survey of Accounting Principles</td>
<td>3</td>
</tr>
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**College and University Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
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<td>3</td>
</tr>
<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
<td></td>
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<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
<td></td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td></td>
</tr>
<tr>
<td>COMM 205</td>
<td>Communication for Technical Professions</td>
<td></td>
</tr>
<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
<td></td>
</tr>
<tr>
<td>Literature in English (p. 405)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Foreign Language (p. 405)</td>
<td></td>
<td>14</td>
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<tr>
<td>MATH 141</td>
<td>Business Mathematics I</td>
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<tr>
<td>or MATH 166</td>
<td>or Topics in Contemporary Mathematics II</td>
<td></td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours** 120

1. ECON 322 may not be applied toward the major.
2. Other courses may qualify. Students should consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts. No course can be counted in more than one category.
3. Courses do not satisfy the College of Liberal Arts Language, Philosophy and Culture requirement or Creative Arts requirement.
4. Must make a grade of C or better.
5. ECON 100-ECON 499 (p. 737) and ECMT 100-ECMT 499 (p. 736) may not be used to fulfill this requirement.
6. 6 hours required. These courses may also be used to satisfy any other requirement.
7. The student may select any courses other than economics courses and ENGL 103 as free electives. No more than 11 credits of any combination of military, air or naval science and physical activity will be allowed to count as electives. Students may also use up to 13 hours of free electives to pursue a minor.

Total of 33 credits. No more than 36 credits in economics and econometrics can be applied to this degree. A grade of C or higher is required for a course to be counted in the major field.

**Economic Electives**

In addition to the electives for the BA in ECON, the following courses may be selected for the ECON-MIA program: BUSH 632, BUSH 635; INTA 608, INTA 616, INTA 625, INTA 630, INTA 632.

See the MIA program in the Graduate Catalog for MIA requirements.

**Economics - 5-Year Bachelor of Arts/Master of Public Service Administration**

The Joint-Degree Program between the Department of Economics and The Bush School of Government & Public Service allows undergraduate Economics students to enter the Master of Public Service Program, with a focus in Public Policy Analysis, at the beginning of their fourth year at Texas A&M University. This program combines the teaching of analytical thinking skills and applications to better understand human behavior as it
relates to public policy and management along with skills in leadership and research methods.

Students will be required to complete the same two-year, 48-hour curriculum as other students admitted to the Bush School’s MPSA program. Students will double-count 9 hours of Bush School courses toward the undergraduate major coursework area and up to 9 hours toward general electives in the Bachelor of Arts degree in Economics. At the completion of the joint degree, students are prepared for a wide variety of post-graduate opportunities including: employment in local, state or federal government, non-profit organizations, or government contracting.

Students interested in this program will apply during the fall of their junior year and, if admitted, begin taking masters-level courses in the fall of their senior year with an undergraduate classification. Students are reclassified as degree seeking master’s students upon completing 96 credit hours, typically in the following semester. These credit hours must include all specific course prerequisites for a baccalaureate degree in Economics, as well as the courses required by the College of Liberal Arts and by Texas A&M University for an undergraduate degree.

**Program Requirements**

Students pursuing the BA-ECON-MPSA degree may double count up to nine hours in Economics Electives and up to nine hours in the General Electives area for a total of 18 hours.

**Core Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 202</td>
<td>Principles of Economics</td>
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<tr>
<td>ECON 203</td>
<td>Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 323</td>
<td>Microeconomic Theory</td>
<td>3</td>
</tr>
<tr>
<td>ECON 410</td>
<td>Macroeconomic Theory</td>
<td>3</td>
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<tr>
<td>Economics electives (p. 737)</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>ACCT 209</td>
<td>Survey of Accounting Principles</td>
<td>3</td>
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**College and University Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following:

- ENGL 203 Writing about Literature
- ENGL 210 Technical and Business Writing
- COMM 203 Public Speaking
- COMM 205 Communication for Technical Professions
- COMM 243 Argumentation and Debate

**Literature in English (p. 405) | 6**

**Foreign Language (p. 405) | 14**

**MATH 141 Business Mathematics I | 3**

or **MATH 166 Topics in Contemporary Mathematics II | 3**

Select one of the following:

- **MATH 131 Mathematical Concepts—Calculus | 3**
- **MATH 151 Engineering Mathematics I | 3**
- **MATH 142 Business Mathematics II | 3**
- **ECMT 461 Economic Data Analysis | 3**

**Life and physical sciences (p. 20) | 9**

**Language, philosophy and culture (p. 21) | 3**

**Creative arts (p. 22) | 3**

**Language, philosophy and culture or creative arts (p. 21) | 3**

**Social and behavioral sciences (p. 23) | 6**

American history (p. 23) | 6

**POLS 206 American National Government | 3**

**POLS 207 State and Local Government | 3**

International and Cultural Diversity (p. 34) | 6

**Free Electives | 13**

**Total Semester Credit Hours | 120**

1. ECON 322 may not be applied toward the major.
2. Other courses may qualify. Students should consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts. No course can be counted in more than one category.
3. Courses do not satisfy the College of Liberal Arts Language, Philosophy and Culture requirement or Creative Arts requirement.
4. Must make a grade of C or better.
5. ECON 100-CON 109 (p. 737) and ECMT 100-ECMT 109 (p. 736) may not be used to fulfill this requirement.
6. 6 hours required. These courses may also be used to satisfy any other requirement.
7. The student may select any courses other than economics courses and ENGL 103 as free electives. No more than 11 credits of any combination of military, air or naval science and physical activity will be allowed to count as electives. Students may also use up to 13 hours of free electives to pursue a minor.

Total of 33 credits. No more than 36 credits in economics and econometrics can be applied to this degree. A grade of C or higher is required for a course to be counted in the major field.

**Economic Electives**

In addition to the electives for the BA in ECON, the following courses may be selected for the ECON-MPSA program: BUSH 632, BUSH 635; PSAA 621, PSAA 622, PSAA 638, PSAA 640, PSAA 674.

See the MPSA program in the Graduate Catalog for MPSA requirements.

**Economics - 5-Year Bachelor of Science/Master of Science in Economics**

The Department of Economics offers a five year joint degree program that provides the opportunity to earn a Bachelor of Science in Economics and a Master of Science in Economics with a focus in either Financial Economics or Financial Econometrics. The MS in Economics Program is a professional, terminal masters degree focused on analytical and quantitative skills in the field of financial economics. In this program, the undergraduate degree requirements are slightly modified to require more mathematics courses in an effort to prepare students for the more rigorous masters-level coursework. Students will double count six hours of masters-level coursework toward the undergraduate degree and complete both the undergraduate degree and the 36-hour Masters degree in five years. At the completion of the degree, students are well-prepared for careers in the financial sector such as: trading analyst, financial consultant, data analyst, distribution analyst and loan administrator.

Students interested in this program will apply during the fall of their junior year and, if admitted, begin taking masters-level courses in the fall of their senior year with an undergraduate classification. Students are reclassified
Program Requirements

Students enrolled in the BS-MS-ECON degree program may double count ECON 607 and ECMT 674 toward the undergraduate major requirements. Undergraduate students must take MATH 151 & MATH 152, and MATH 304 or MATH 323, in addition to the other University Core Curriculum, College of Liberal Arts, and Department of Economics-specific degree requirements.

Core Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Credits</th>
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<td>Principles of Economics</td>
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<td>ECON 203</td>
<td>Principles of Economics</td>
<td>3</td>
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<tr>
<td>ECON 323</td>
<td>Microeconomic Theory</td>
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<td>ECON 410</td>
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<td>ECON 460</td>
<td>Introduction to Mathematical Economics</td>
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Economics Electives

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<thead>
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<th>Course</th>
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<tbody>
<tr>
<td>ECMT 475</td>
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<tr>
<td>ECON 301-499</td>
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<tr>
<td>ECON 607</td>
<td>Foundations of Microeconomic Theory</td>
<td>3</td>
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<tr>
<td>ECMT 674</td>
<td>Economic Forecasting</td>
<td>3</td>
</tr>
<tr>
<td>ACCT 209</td>
<td>Survey of Accounting Principles</td>
<td>3</td>
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<tr>
<td>ACCT 210</td>
<td>Survey of Managerial and Cost Accounting Principles</td>
<td>3</td>
</tr>
<tr>
<td>MATH 304</td>
<td>Linear Algebra</td>
<td>3</td>
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<tr>
<td>or MATH 323</td>
<td>Linear Algebra</td>
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College and University Requirements

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<td>Composition and Rhetoric</td>
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<tr>
<td>Select one of the following:</td>
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<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
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</tr>
<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
<td></td>
</tr>
<tr>
<td>Literature in English</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 152</td>
<td>Engineering Mathematics II</td>
<td>4</td>
</tr>
<tr>
<td>ECMT 461</td>
<td>Economic Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>ECMT 463</td>
<td>Introduction to Econometrics</td>
<td>3</td>
</tr>
<tr>
<td>Life and physical sciences (p. 20)</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Creative arts (p. 22)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Language, philosophy and culture (p. 21)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Language, philosophy and culture or creative arts (p. 21)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Social and behavioral sciences (p. 23)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>American history (p. 23)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
</tr>
<tr>
<td>International and cultural diversity (p. 34)</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

Free electives

Total Semester Credit Hours

1. ECON 322 may not be applied toward the major.
2. Other courses may qualify. Students should consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts. No course can be counted in more than one category.
3. MATH 151 and MATH 152 are four credit hour courses. Three hours will count toward the Mathematics requirement for each course and the remaining one hour for each course will count toward free electives.
4. Must make grade of C or better.
5. ECON 100-ECON 499 (p. 737) and ECMT 100-ECMT 499 (p. 736) may not be used to fulfill this requirement.
6. Six hours required. These courses may also be used to satisfy any other requirement.
7. The student may select any courses other than economics courses and ENGL 103 as free electives. No more than 11 credits of any combination of military, air, or naval science and physical activity will be allowed to count as electives.

Total of 33 credits. No more than 39 credits in economics and econometrics can be applied to this degree. A grade of C or higher is required for a course to be counted in the major field.

Economics - 5-Year Bachelor of Science/Master of International Affairs

The Joint-Degree Program between the Department of Economics and The Bush School of Government & Public Service allows undergraduate Economics students to enter the Master of International Affairs Program, with a focus in International Economics and Development, at the beginning of their fourth year at Texas A&M University. This program combines the teaching of analytical thinking skills and applications to better understand human behavior as it relates to international economic development along with skills in diplomacy, research, and development of a global perspective.

Students will be required to complete the same two-year, 48-hour curriculum as other students admitted to the Bush School’s MIA program. Students will double-count 6 hours of Bush School courses toward the undergraduate major coursework area, 3 hours toward ECMT 463, and up to 9 hours toward general electives in the Bachelor of Science degree in Economics. At the completion of the joint degree, students are prepared for a wide variety of post-graduate opportunities including: employment in global commerce, government, government contracting, national security, and transfer pricing.

Students interested in this program will apply during the fall of their junior year and, if admitted, begin taking masters-level courses in the fall of their senior year with an undergraduate classification. Students are reclassified as degree seeking master’s students upon completing 96 credit hours, typically in the following semester. These credit hours must include all specific course prerequisites for a baccalaureate degree in Economics, as well as the courses required by the College of Liberal Arts and by Texas A&M University for an undergraduate degree.
## Program Requirements

**Core Requirements**  
ECON 202 Principles of Economics  
ECON 203 Principles of Economics  
ECON 323 Microeconomic Theory  
ECON 410 Macroeconomic Theory  

**Economics electives**  
ECMT 463 Introduction to Econometrics  
ECMT 475 Economic Forecasting  
ECON 301-ECON 499 (p. 737)  
ACCT 209 Survey of Accounting Principles  
ACCT 210 Survey of Managerial and Cost Accounting Principles

**College and University Requirements**  
ENGL 104 Composition and Rhetoric  
Select one of the following:  
ENGL 203 Writing about Literature  
ENGL 210 Technical and Business Writing  
COMM 203 Public Speaking  
COMM 205 Communication for Technical Professions  
COMM 243 Argumentation and Debate  

**Literature in English** (p. 407)  
MATH 141 Business Mathematics I  
MATH 142 Business Mathematics II  
ECMT 461 Economic Data Analysis  
ECMT 463 Introduction to Econometrics  
Life and physical sciences (p. 20)  
Language, philosophy and culture (p. 21)  
Creative arts (p. 22)  
Language, philosophy and culture or creative arts (p. 21)  
Social and behavioral sciences (p. 23)  
American history (p. 23)  
POLS 206 American National Government  
POLS 207 State and Local Government  
International and Cultural Diversity (p. 34)  
Free Electives  

**Total Semester Credit Hours**  
120

---

1. ECON 322 may not be applied toward the major.
2. Must make a grade of C or better.
3. Other courses may qualify. Students should consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts. No course can be counted in more than one category.
4. ECON 100-ECON 499 (p. 737) and ECMT 100-ECMT 499 (p. 736) may not be used to fulfill this requirement.
5. 6 required hours. These courses may also be used to satisfy any other requirement.
6. The student may select any courses other than economics courses and ENGL 103 as free electives. No more than 11 credits of any combination of military, air or naval science and physical activity will be allowed to count as electives. Students may also use up to 18 hours of free electives to pursue a minor.

Total of 33 credits. No more than 39 credits in economics and econometrics can be applied to this degree. A grade of C or higher is required for a course to be counted in the major field.

### Economic Electives

In addition to the electives for the BA in ECON, the following courses may be selected for the ECON-MIA program: BUSH 632, BUSH 635; INTA 608, INTA 616, INTA 625, INTA 630, INTA 632.

See the MIA program in the Graduate Catalog for MIA requirements.

### Economics - 5-Year Bachelor of Science/Master of Public Service Administration

The Joint-Degree Program between the Department of Economics and The Bush School of Government & Public Service allows undergraduate Economics students to enter the Master of Public Service Program, with a focus in Public Policy Analysis, at the beginning of their fourth year at Texas A&M University. This program combines the teaching of analytical thinking skills and applications to better understand human behavior as it relates to public policy and management along with skills in leadership and research methods.

Students will be required to complete the same two-year, 48-hour curriculum as other students admitted to the Bush School’s MPSA program. Students will double-count 6 hours of Bush School courses toward the undergraduate major coursework area, 3 hours toward ECMT 463, and up to 9 hours toward general electives in Bachelor of Science degree in Economics. At the completion of the joint degree, students are prepared for a wide variety of post-graduate opportunities including: employment in local, state or federal government, non-profit organizations, or government contracting.

Students interested in this program will apply during the fall of their junior year and, if admitted, begin taking masters-level courses in the fall of their senior year with an undergraduate classification. Students are reclassified as degree seeking master’s students upon completing 96 credit hours, typically in the following semester. These credit hours must include all specific course prerequisites for a baccalaureate degree in Economics, as well as the courses required by the College of Liberal Arts and by Texas A&M University for an undergraduate degree.

### Program Requirements

Students pursuing the BS-ECON-MPSA degree may double count up to six hours in Economics Electives, three hours for the ECMT 463 (BUSH 635) requirement and up to nine hours in the General Electives area for a total of 18 hours.

**Core Requirements**  
ECON 202 Principles of Economics  
ECON 203 Principles of Economics  

---

1. ECON 322 may not be applied toward the major.
2. Must make a grade of C or better.
3. Other courses may qualify. Students should consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts. No course can be counted in more than one category.
4. ECON 100-ECON 499 (p. 737) and ECMT 100-ECMT 499 (p. 736) may not be used to fulfill this requirement.
College of Liberal Arts

ECON 323  Microeconomic Theory  3  
ECON 410  Macroeconomic Theory  3  

**Economics electives**  21

- ECMT 463  Introduction to Econometrics  
- ECMT 475  Economic Forecasting  
- ECON 301-ECON 499 (p. 737)  
- ACCT 209  Survey of Accounting Principles  3  
- ACCT 210  Survey of Managerial and Cost Accounting Principles  3  

**College and University Requirements**  3

- ENGL 104  Composition and Rhetoric  3  

Select one of the following:

- ENGL 203  Writing about Literature  
- ENGL 210  Technical and Business Writing  
- COMM 203  Public Speaking  
- COMM 205  Communication for Technical Professions  
- COMM 243  Argumentation and Debate  

**Total Semester Credit Hours**  120

---

1. ECON 322 may not be applied toward the major.  
2. Must make a grade of C or better.  
3. Other courses may qualify. Students should consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts. No course can be counted in more than one category.  
4. ECON 100-ECON 499 (p. 737) and ECMT 100-ECMT 499 (p. 736) may not be used to fulfill this requirement.  
5. 6 required hours. These courses may also be used to satisfy any other requirement.

6. The student may select any courses other than economics courses and ENGL 103 as free electives. No more than 11 credits of any combination of military, air or naval science and physical activity will be allowed to count as electives. Students may also use up to 18 hours of free electives to pursue a minor.

Total of 33 credits. No more than 39 credits in economics and econometrics can be applied to this degree. A grade of C or higher is required for a course to be counted in the major field.

**Economic Electives**

In addition to the electives for the BA in ECON, the following courses may be selected for the ECON-MPSA program: BUSH 631, BUSH 632, BUSH 635; PSAA 621, PSAA 622, PSAA 638, PSAA 663/AGEC 604, PSAA 674.

See the MPSA program in the Graduate Catalog for MPSA requirements.

**Economics - Minor**

The study of economics provides a rigorous structure for decision-making, whether on academic topics or day-to-day activities such as how to divide roommate expenses or how to allocate time between study and recreation. Economics teaches students how to think rationally about problems, a skill that is essential in any profession.

A minor in economics provides knowledge and information that will make a student a better-informed consumer and participant in the world economy. It also provides a basis for a better understanding of world events.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 202</td>
<td>Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 203</td>
<td>Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>ECON 323</td>
<td>Microeconomic Theory</td>
<td>3</td>
</tr>
<tr>
<td>ECON electives</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

Select two courses from the following:

- ECON 300-499 (p. 737)  
- ECMT 463  Introduction to Econometrics  
- ECMT 475  Economic Forecasting  

**Total Semester Credit Hours**  15

1. ECON 322 does not count toward minor.

Students must make a grade of “C” or better in all courses.

**Business Economics - Certificate**

The Business Economics Certificate (BEC) is an innovative program designed to prepare students for successful careers in a rapidly changing economic environment. The certificate combines a foundation in Economics in the College of Liberal Arts with a business minor in the Mays College of Business, integrating the practical skills taught in business courses with the analytical tools of economics.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECMT 463</td>
<td>Introduction to Econometrics</td>
<td>3</td>
</tr>
<tr>
<td>ECMT 475</td>
<td>Economic Forecasting</td>
<td>3</td>
</tr>
</tbody>
</table>

Prescribed electives
Select two of the following:\(^1\)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 315</td>
<td>Sports Economics</td>
</tr>
<tr>
<td>ECON 420</td>
<td>Law and Economics</td>
</tr>
<tr>
<td>ECON 425</td>
<td>The Organization of Industry</td>
</tr>
<tr>
<td>ECON 426</td>
<td>Economics of Antitrust and Regulation</td>
</tr>
<tr>
<td>ECON 433</td>
<td>Energy Markets and Policy</td>
</tr>
<tr>
<td>ECON 445</td>
<td>Financial Economics</td>
</tr>
<tr>
<td>ECON 449</td>
<td>Economics of Decision-Making Strategy</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 12

1 ECMT 461 and ECMT 463 are prerequisites for this course.

2 ECMT 475 and the required six hours of electives may also be used to satisfy the Economics electives requirement.

Students pursuing this certificate must also complete a minor in Business Administration (BUAD) (p. 211).

**Quantitative Economic Methods - Certificate**

The Quantitative Economic Methods certificate program prepares students for entry into an economics Ph.D. program or highly quantitatively-oriented occupation such as economic consulting and research. Students select from a set of courses in the Statistics and Mathematics departments to broaden their understanding of the fundamental basis of advanced economics. In addition, students are required to take several intensive economics courses focused on mathematical and statistical topics. Students interested in this certificate are also strongly encouraged to participate in undergraduate research activities in the Department of Economics.

**Program Requirements**

**Required courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECMT 475</td>
<td>Economic Forecasting(^1)</td>
<td>3</td>
</tr>
<tr>
<td>ECON 460</td>
<td>Introduction to Mathematical Economics(^2)</td>
<td>3</td>
</tr>
<tr>
<td>ECON 470</td>
<td>Program Evaluation</td>
<td>3</td>
</tr>
</tbody>
</table>

Select three of the following:\(^3\)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 220</td>
<td>Foundations of Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 221</td>
<td>Several Variable Calculus</td>
<td>3</td>
</tr>
<tr>
<td>MATH 304</td>
<td>Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 323</td>
<td>Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>MATH 409</td>
<td>Advanced Calculus I</td>
<td>3</td>
</tr>
<tr>
<td>STAT 414</td>
<td>Mathematical Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>STAT 415</td>
<td>Mathematical Statistics II</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 18

1 ECMT 461 and ECMT 463 are prerequisites for this course.

2 Completion of MATH 151 and higher is suggested when enrolling in this course.

3 All MATH and STAT courses listed require a minimum of MATH 151 and MATH 152.

**Department of English**

The study of English language and literature is central to an understanding of our culture and our relationship to it. Mastery of the English language is essential to all of us at Texas A&M, no matter what our interests or profession. An awareness of our heritage as it is embodied in great literary works provides us with a sense of the traditions, ideas, and rhetorics that have shaped us and our world; it enables us to define ourselves and our values in relation to this valued past. The Department of English offers students an opportunity to explore our linguistic and literary inheritance. Courses are offered in British literature, American literature, rhetoric and composition, creative writing, literary criticism, linguistics, and film. Students can discover the roots of the English language or learn about the latest linguistic theories. They can acquire the skills necessary to be a technical writer and editor or begin to learn the craft of writing poetry and fiction. They can immerse themselves in literature from Beowulf to Virginia Woolf, from Captain John Smith to Toni Morrison; and they can explore the extensions and challenges to tradition found in women’s writing, ethnic literature, and postmodernist experimentation. Students also may explore literature in relation to the other arts and religion and culture, and investigate the global through studies in Asian, Africana, Caribbean, postcolonial, transnational and other literatures. The flexibility of the degree in English and the options available in the department enable students to pursue their own interests while acquiring important analytic and writing skills and discovering the riches of our literary heritage.

English graduates, with relevant minors or specialized courses outside English, may pursue careers in technical writing, editing and publishing, government service, public relations, personnel work, and advertising or administrative positions in business and industry. The program in English also provides excellent preparation for later professional training in law, medicine, business and the ministry, as well as for graduate work in information studies and in the humanities, including English. Supported by work in the College of Education and Human Development, the English program also may lead to careers in teaching or educational administration.

The curriculum in English is designed to allow students to develop concentrations in such areas as composition and rhetoric, creative writing, linguistics, literature and film, or coursework relevant to teacher certification.

**Teacher Certification Programs in English**

**Teacher Certification in English Language Arts/Reading - OPTION II (Secondary)**

Students desiring certification by Option II to teach English language arts and reading in the secondary schools of Texas should consult an undergraduate English advisor as early as possible. Requirements include 27 semester hours in literature, language, reading, and rhetoric and composition (an optional 24-30 hours in a second teaching field is possible); and professional education courses.

**Degree and Certification Program for Middle School in English Language Arts/Reading**

The Department of English offers a degree and certification program in English language arts/reading for prospective middle-school teachers. This program requires 36 hours of literature, linguistics, composition and rhetoric and 15 hours of reading along with an 18-hour professional education component.
All students seeking certification should consult an undergraduate English advisor for additional information.

Professional Writing Certificate

The Professional Writing Certificate gives students 18 hours of intensive training in a broad range of communication skills. Students who achieve a grade of B or better in all 18 hours of coursework will receive a certificate signifying their successful completion of this training. Students should allow at least a year and a half to complete the courses, some of which are offered only once a year. Transfer courses, independent studies and credit by exam cannot be counted toward the 18 hours. Required courses include ENGL 210, ENGL 241, ENGL 320, and ENGL 355. With the help of the Professional Writing Certificate Advisor, the student must also select two additional courses in rhetoric, communication or a related field.

Faculty

Alonzo, Juan J, Associate Professor
English
DSc, Washington University in St Louis, 1991

Balester, Valerie M, Professor
English
PhD, Texas A&M University, 1993

Bhattacharya, Nandini, Professor
English
PhD, University of Rochester, 1992

Boenig, Robert E, Professor
English
PhD, Rutgers University, 1978

Clark, William B, Professor
English
PhD, Louisiana State University, 1973

Collins, Michael S, Associate Professor
English
PhD, Columbia University, 1999

Cooper, Rich P, Lecturer
English
PhD, Louisiana State University, 2011

Delnegro, Giovanna P, Associate Professor
English
PhD, Indiana University, 1999

Dickson, Donald R, Professor
English
PhD, University of Illinois at Urbana-Champaign, 1981

Dworkin, Ira M, Assistant Professor
English
PhD, City University of New York, 2003

Earhart, Amy E, Associate Professor
English
PhD, Texas A&M University, 1999

Egenolf, Susan B, Associate Professor
English
PhD, Texas A&M University, 1995

Eide, Marian, Associate Professor
English
PhD, University of Pennsylvania, 1994

Estill, Laura A, Assistant Professor
English
PhD, Wayne State University, 2010

Ezell-Mainzer, Margaret, Distinguished Professor
English
PhD, Cambridge University, 1981

Griffin, Robert J, Associate Professor
English
PhD, Yale University, 1985

Gutierrez, Kristina A, Lecturer
English
PhD, University Of Texas, San Antonio, 2012

Hannah, James R, Professor
English
MFA, University of Iowa, 1980

Harris, Jason M, Lecturer
English
PhD, University of Washington, 2001

Hawkins, Cecelia E, Instructional Professor
English
MA, Stephen F. Austin University, 1975

Hoagwood, Terence A, Professor
English
PhD, University of Maryland, 1979

Hodgson, Lucia K, Assistant Professor
English
PhD, University of Southern California, 2009

Howell, Jessica M, Assistant Professor
English
PhD, University of California, Davis, 2008

Ives, Maura C, Professor
English
PhD, University of Virginia, 1990

Jackson, Shona N, Associate Professor
English
PhD, Stanford University, 2005

Johansen Aase, Emily J, Associate Professor
English
PhD, McMaster University, 2008

Kallendorf, Craig W, Professor
English
PhD, University of North Carolina at Chapel Hill, 1982

Kendall, Shari E, Associate Professor
English
PhD, Georgetown University, 1999
Kinkead, April L, Lecturer
English
MA, University of Texas, Austin, 2013

Loving, Jerome M, Distinguished Professor
English
PhD, Duke University, 1973

Machann, Clinton J, Professor
English
PhD, University of Texas, 1976

Mandell, Laura C, Professor
English
PhD, Cornell University, 1992

Matthews, Pamela R, Professor
English
PhD, Duke University, 1988

McCann, Janet P, Professor
English
PhD, University of Pittsburgh, 1974

McWhirter, David B, Associate Professor
English
PhD, University of Virginia, 1984

Mize, Britt A, Associate Professor
English
PhD, University of North Carolina at Chapel Hill, 2003

Morey, Anne M, Associate Professor
English
PhD, University of Texas, Austin, 1998

Murray, Christine A, Instructional Assistant Professor
English
PhD, University of Texas, Arlington, 2005

Nair, Dimple, Lecturer
English
MA, University of Mysore (India), 1997

Nelson, Claudia B, Professor
English
PhD, Indiana University, 1989

O'Farrell, Mary A, Associate Professor
English
PhD, University of California, Berkeley, 1991

Oliver, Lawrence J, Professor
English
PhD, Pennsylvania State University, 1981

Perry, Nandra L, Associate Professor
English
PhD, University of North Carolina at Chapel Hill, 2003

Pilsch, Andrew, Assistant Professor
English
PhD, Pennsylvania State University, 2011

Portales, Marco A, Professor
English
PhD, University of Buffalo, 1975

Reddy, Vanita D, Assistant Professor
English
PhD, University of California, Davis, 2009

Reynolds, Larry J, Distinguished Professor
English
PhD, Duke University, 1974

Robinson, Elizabeth K, Instructional Associate Professor
English
PhD, Texas A&M University, 1995

Robinson, Sally A, Associate Professor
English
PhD, University of Washington, 1989

Ross, Shawna, Assistant Professor
English
PhD, Pennsylvania State University, 2011

Rowell, Charles H, Professor
English
PhD, Ohio State University, 1972

Stabile, Susan M, Associate Professor
English
PhD, University of Delaware, 1996

Taylor, Charles B, Instructional Professor
English
PhD, Northern Illinois University, 1971

Tebeaux, Elizabeth D, Professor
English
PhD, Texas A&M University, 1977

Tuhkanen, Mikko J, Associate Professor
English
PhD, University at Buffalo, State University of New York, 2005

Vasilakis, Apostolos, Instructional Assistant Professor
English
PhD, Emory University, 2004

Wollock, Jennifer G, Professor
English
PhD, Harvard University, 1981

Majors
• Bachelor of Arts in English (p. 447)
• Bachelor of Arts in English, Middle School Teacher Certification (p. 448)

Minors
• English Minor (p. 449)
English - BA

The curriculum in English is designed to allow students to develop concentrations in such areas as composition and rhetoric, creative writing, linguistic, literature and film, or coursework relevant to teacher certification.

Program Requirements

Required Courses

ENGL 303 Approaches to English Studies 3

Literary Histories I

Select one of the following: 3

ENGL 221/ MODL 221 World Literature
ENGL 227 American Literature: The Beginnings to Civil War
ENGL 231 Survey of English Literature I
ENGL 313 Medieval English Literature
ENGL 314 The English Renaissance
ENGL 315 Seventeenth-Century Literature
ENGL 317 Early British Drama
ENGL 353 History of Rhetoric
ENGL 412 Studies in Rhetoric
ENGL 414 Milton
ENGL 431 Chaucer

Literary Histories II

Select one of the following: 3

ENGL 222/ MODL 222 World Literature
ENGL 232 Survey of English Literature II
ENGL 316 Eighteenth-Century Literature and Culture
ENGL 321 Nineteenth-Century Literature (Romantic)
ENGL 322 Nineteenth-Century Literature (Victorian)
ENGL 323 The American Renaissance
ENGL 373 American Realism and Naturalism
ENGL 375 Nineteenth-Century American Novel
ENGL 377 The British Novel to 1870.

Literary Histories III

Select one of the following: 3

ENGL 228 American Literature: Civil War to Present
ENGL 336 Life and Literature of the Southwest
ENGL 337 Life and Literature of the American South
ENGL 340 Modern and Contemporary Drama
ENGL 350 Twentieth-Century Literature to World War II.
ENGL 352 Literature, World War II to Present.
ENGL 356/ FILM 356 Literature and Film
ENGL 372 American Poetry
ENGL 376 The American Novel Since 1900
ENGL 378 The British Novel, 1870 to Present.
ENGL 379/ AFST 379 Postcolonial Literatures
ENGL 401 Contemporary Literary Theory

Literary Histories IV

Select one of the following: 3

ENGL 204/ AFST 204 Introduction to African-American Literature
ENGL 205/ AFST 205 Introduction to Africana Literature
ENGL 329/ AFST 329 African-American Literature Pre-1930
ENGL 333/ WGST 333 Gay and Lesbian Literature
ENGL 338 American Ethnic Literature
ENGL 339/ AFST 339 African-American Literature Post-1930
ENGL 357 Native American Rhetorics and Literatures
ENGL 362/ LING 362 Latino/a Literature
ENGL 372 American Poetry
ENGL 374/ WGST 374 Women Writers
ENGL 376 The British Novel Since 1900
ENGL 378 The British Novel since 1870 to Present.
ENGL 379/ AFST 379 Postcolonial Literatures

College and University Requirements

Communication

Select one of the following: 3

ENGL 104 Composition and Rhetoric
ENGL 210 Technical and Business Writing
COMM 203 Public Speaking
COMM 205 Communication for Technical Professions
COMM 243 Argumentation and Debate

ENGL 203 Writing about Literature 3

Foreign language (p. 405) 14

Mathematics (p. 20) 2

Life and physical sciences (p. 20) 9

Creative arts (p. 22) 3

Language, philosophy and culture (p. 21) 3

Language, philosophy and culture or creative arts (p. 21) 3

Social behavioral sciences (p. 23) 3

POLS 206 American National Government 3

POLS 207 State and Local Government 3

American history (p. 23) 6

General electives (may include optional minor) 25

International and cultural diversity (p. 34) 5

Total Semester Credit Hours 120

1 Majors must complete two ENGL courses formally designated as writing intensive.
2 At least 3 hours must be in MATH. Three hours may be PHIL 240.
Middle School Certificate seekers should consult an undergraduate English advisor for required courses.

English courses may not be used as elective hours.

International and cultural diversity (p. 34) courses may also be used to satisfy any other requirement.

Up to 39 credits in English can be applied to the degree; at least 21 credits must be in literature. A grade of C or higher is required for a course to be counted in the major. For residency, a student must have at least 12 hours in 300- or 400-level English classes from Texas A&M University.

College and University Requirements

Other courses may qualify for the following categories. All courses are to be selected with the approval of the student’s academic advisor. The courses incorporate University Core Curriculum (p. 19) requirements. No course can be counted in more than one category, except as allowed in the minor field of study and the International and Cultural Diversity (p. 34) graduation requirement. A minimum of 36 hours of 300- or 400-level coursework must be completed at Texas A&M University, with at least 12 of those hours being in the major.

Minor Field of Study

English majors are advised, but not required, to select a minor field of study. Students who elect to complete a minor should contact the department or program that offers the minor to determine the requirements for that minor. A grade of C or higher is required for a course to be counted in the minor field. A minor field must be declared before the student has completed 75 credit hours.

English - BA, Middle School Teacher Certification

The Department of English offers a degree and certification program in English language arts/reading for prospective middle-school teachers. This program requires 36 hours of literature, linguistics, composition and rhetoric and 15 hours of reading along with an 18-hour professional education component.

All students seeking certification should consult an undergraduate English advisor for additional information.

Program Requirements

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>ENGL 303</td>
<td>Approaches to English Studies</td>
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Literary Histories I

Select one of the following:

<table>
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<th>Course</th>
<th>Title</th>
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<tr>
<td>ENGL 221</td>
<td>World Literature</td>
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<tr>
<td>MODL 221</td>
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<tr>
<td>ENGL 227</td>
<td>American Literature: The Beginnings to Civil War</td>
<td>3</td>
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<tr>
<td>ENGL 231</td>
<td>Survey of English Literature I</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 313</td>
<td>Medieval English Literature</td>
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<td>ENGL 314</td>
<td>The English Renaissance</td>
<td>3</td>
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<td>ENGL 315</td>
<td>Seventeenth-Century Literature</td>
<td>3</td>
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<tr>
<td>ENGL 317</td>
<td>Early British Drama</td>
<td>3</td>
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<tr>
<td>ENGL 353</td>
<td>History of Rhetoric</td>
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<td>ENGL 412</td>
<td>Studies in Shakespeare</td>
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Literary Histories II

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<td>ENGL 232</td>
<td>Survey of English Literature II</td>
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<td>ENGL 316</td>
<td>Eighteenth-Century Literature and Culture</td>
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<td>ENGL 321</td>
<td>Nineteenth-Century Literature (Romantic)</td>
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<td>ENGL 322</td>
<td>Nineteenth-Century Literature (Victorian)</td>
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<td>ENGL 323</td>
<td>The American Renaissance</td>
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<td>ENGL 373</td>
<td>American Realism and Naturalism</td>
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<td>ENGL 375</td>
<td>Nineteenth-Century American Novel</td>
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<tr>
<td>ENGL 377</td>
<td>The British Novel to 1870.</td>
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Literary Histories III

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<td>ENGL 228</td>
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<td>ENGL 336</td>
<td>Life and Literature of the Southwest</td>
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<td>ENGL 337</td>
<td>Life and Literature of the American South</td>
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<td>ENGL 340</td>
<td>Modern and Contemporary Drama</td>
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<td>ENGL 350</td>
<td>Twentieth-Century Literature to World War II.</td>
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<td>Literature, World War II to Present.</td>
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<td>ENGL 356</td>
<td>Literature and Film</td>
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<td>ENGL 372</td>
<td>American Poetry</td>
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<td>ENGL 376</td>
<td>The American Novel Since 1900</td>
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<td>ENGL 378</td>
<td>The British Novel, 1870 to Present.</td>
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<td>ENGL 379</td>
<td>Postcolonial Literatures</td>
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<td>AFST 379</td>
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<td>ENGL 401</td>
<td>Contemporary Literary Theory</td>
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Literary Histories IV

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<td>ENGL 205</td>
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<td>AFST 205</td>
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<td>ENGL 329</td>
<td>African-American Literature Pre-1930</td>
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<td>ENGL 333</td>
<td>Gay and Lesbian Literature</td>
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<td>ENGL 338</td>
<td>American Ethnic Literature</td>
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<td>ENGL 339</td>
<td>African-American Literature Post-1930</td>
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<td>ENGL 357</td>
<td>Native American Rhetorics and Literatures</td>
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<td>ENGL 362</td>
<td>Latino/a Literature</td>
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<td>HISP 362</td>
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<td>ENGL 374</td>
<td>Women Writers</td>
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<td>ENGL 391</td>
<td>Folklore, Literature, and World Cultures</td>
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<td>ENGL 393</td>
<td>Studies in Africana Literature and Culture</td>
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<td>ENGL 474</td>
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<td>ENGL 481</td>
<td>Senior Seminar</td>
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ENGL 414  Milton
ENGL 431  Chaucer
Major concentration/electives
Select four of the following: 12
ENGL 100-ENGL 499 (p. 753)
LING 200-LING 499 (p. 859)

Supporting Coursework
RDNG 371 Multicultural and Interdisciplinary Literature for Middle Grades 3
RDNG 372 Reading and Writing across the Middle Grades Curriculum 3
RDNG 461 Teaching Reading Through Children's Literature 3
RDNG 470 Reading/Language Arts Methods in Middle Grades Education 3
RDNG 490 Assessment in Reading Instruction in Middle Grades 3

Teaching requirement
EDCI 354 Early Childhood and Adolescent Curriculum and Lesson Design 3
TEFB 371 Dynamics and Management in Multicultural/Inclusionary Learning Environments 3
MEFB 452 Curriculum and Instruction for Middle Grades 3
INST 362 English as a Second Language Methods I 3
MEFB 497 Supervised Clinical Teaching 6

College and University Requirements
Communication
Select one of the following: 3
ENGL 104 Composition and Rhetoric
ENGL 210 Technical and Business Writing
COMM 203 Public Speaking
COMM 205 Communication for Technical Professions
COMM 243 Argumentation and Debate
ENGL 203 Writing about Literature
Foreign language (p. 405) 14
Mathematics (p. 20) 2 6
Life and physical sciences (p. 20) 9
Creative arts (p. 22) 3
Language, philosophy and culture (p. 21) 3
Language, philosophy and culture or creative arts (p. 21) 3
INST 210 Understanding Special Populations 3
INST 222 Foundations of Education in a Multicultural Society 3
POL 206 American National Government 3
POL 207 State and Local Government 3
American history (p. 23) 6
International and cultural diversity (p. 34) 3

Total Semester Credit Hours 125

1 Majors must complete two ENGL courses formally designated as writing intensive.
2 At least 3 hours must be in MATH. Three hours may be PHIL 240.
3 International and cultural diversity courses may also be used to satisfy any other requirement.

College and University Requirements
Other courses may qualify for the following categories. All courses are to be selected with the approval of the student's academic advisor. The following lists incorporate University Core Curriculum requirements. No course can be counted in more than one category, except as allowed in the minor field of study and the International and Cultural Diversity Graduation requirement. A minimum of 36 hours of 300- or 400-level coursework must be completed at Texas A&M University, with at least 12 of those hours being in the major.

English - Minor

Students seeking to minor in English should consult with their advisor and with the Office of Undergraduate Studies in English.

Program Requirements
ENGL 100-499 (p. 753) 9
ENGL 300-499 (p. 753) 9
Total Semester Credit Hours 18

Students must earn a C or higher in each course to be counted in the minor field.

Department of Hispanic Studies

At a time when worldwide globalization includes the demographically and culturally significant Hispanicization of Texas, along with other areas of the United States, the study of the Spanish language and Hispanic culture is important to achieve an understanding of the world in which we live. The mission of the Department of Hispanic Studies is to create and disseminate knowledge about the cultures and languages of the Hispanic world. Our research agenda includes Hispanic contemporary and period literature, film and performance, photography, iconography and digital humanities, cultural studies, gender and diaspora studies, and the history and presence of Spanish in the United States. We offer a Bachelor of Arts in Spanish, a Minor in Spanish, and a Minor in Hispanic Studies for Community Engagement. In all cases, the development of proficiency in the Spanish language is at the core of these programs.

With class sizes that rarely exceed 30 students, we are recognized for our excellent teaching and personalized attention to student needs. Our department offers a full range of courses for undergraduates, including language instruction and content courses in literature, culture, professional Spanish, and linguistics. An undergraduate major in Spanish can show future employers and/or graduate schools that a student has achieved a high level of linguistic ability and understanding of Hispanic cultures. The undergraduate major is designed to help students grow in their oral and written language skills as they learn more about Hispanic cultures through literature and cultural studies. This kind of study is valuable for those who plan to go into international careers or for those who plan to work with Hispanic populations in the United States. A Spanish major is useful in careers such as banking, advertising, marketing, journalism, health services, government, social welfare and public administration, and it is an excellent preparation for professional school in medicine, law, and business. Teaching certification is available to Spanish majors through the College of Education and Human Development.
The department insists on a high level of language competence as the basis for other intellectual growth in the discipline and requires a 10-week experience abroad. To help facilitate the fulfillment of this requirement, the department sponsors a summer study abroad program for credit in a variety of locations, such as Spain, Ecuador, Costa Rica, and Mexico. Semester and year-long study abroad programs, reciprocal exchanges and internships are also available and encouraged.

**Spanish Bilingual/Bicultural Enhancement Initiative**

The Hispanic Studies faculty recommends that Spanish language students, especially heritage speakers of Spanish and Advanced Placement (AP) students, take a healthy mixture of coursework related, on the one hand, to achieving University-level linguistic competence in the language; and coursework related to the Hispanic or Latino cultural experience on the other. To this end students select from courses on language, grammar and culture in spoken and written Spanish and electives which broaden the Hispanic/Latino knowledge base taught in English. A prudent and timely selection of courses can allow the student to apply coursework taken in the pursuit of bilingual/biculturalism to satisfy some requirements on the student's degree plan. Many of the suggested courses will apply in the Core Curriculum, for example, in areas such as Humanities and Social Sciences. Discussions with a departmental advisor can help students to focus the best possible fit of coursework with their interests and degree plan.

**HiSP and SPAN Courses**

Reflective of its dual mission of striving to provide students with opportunities for cultural and linguistic competence, the Department of Hispanic Studies offers courses under two different rubrics, HiSP (p. 812) and SPAN (p. 982). In the first case, courses cover a variety of topics pertinent to culture in the Hispanic world, and they are conducted in English. HiSP (p. 812) courses deal with topics such as food, film, literature, music and visual culture as well as social and political issues. SPAN (p. 982) courses are conducted in Spanish, and while they also deal with cultural topics ranging from literature to visual culture, they emphasize aspects of language and linguistic development.

**Required Foreign Language Placement Test**

Students who intend to enroll for the first time in a college foreign language course, who have previous knowledge of the language, however acquired, and who have no college credit in the language MUST take a placement test to determine the appropriate course for their level of ability. The foreign language placement test also serves as a basis for the credit by examination.

Students who take the Advanced Placement (AP) test or other acceptable tests which grant college-level credit in Spanish do not have to take the required foreign language placement test, as the results of these tests may be used for placement, but they are encouraged to do so nonetheless. Heritage learners, or those who have acquired any level of Spanish outside of a formal academic setting, are also expected to take the exam to guarantee correct placement.

The Spanish Language Placement Test is administered by the Department of Hispanic Studies on the Pre-Conference Day of the New Student Conference along with other credit by examination tests. The test is also offered twice per week during the fall and spring semesters. Students who do not take the placement test on the Pre-Conference Day will not be able to register for a foreign language course during their first semester.

**International students whose native language is not English** are exempted from satisfying the University foreign language requirement. These students are not allowed to register in those courses in their native language (101, 102) which are used to fulfill that requirement.

**Faculty**

- Arizpe, Norma L, Senior Lecturer
  Hispanic Studies
  MA, University of Michigan, 1977

- Arizpe, Victor, Professor
  Hispanic Studies
  PhD, University of Michigan, 1982

- Curry, Richard K, Associate Professor
  Hispanic Studies
  PhD, Arizona State University, 1982

- Espina, Eduardo D, Professor
  Hispanic Studies
  PhD, Washington University in St. Louis, 1987

- Galdo, Juan, Associate Professor
  Hispanic Studies
  PhD, University of Colorado, 2003

- Imhoff, Brian J, Associate Professor
  Hispanic Studies
  PhD, University of Illinois at Urbana-Champaign, 1996

- Kallendorf, Hilaire A, Professor
  Hispanic Studies
  PhD, Princeton University, 2000

- Lawo-Sukam, Alain, Associate Professor
  Hispanic Studies
  PhD, University of Illinois at Urbana-Champaign, 2005

- Luiselli, Alessandra, Professor
  Hispanic Studies
  PhD, University of New Mexico, 1990

- Miller, Stephen J, Professor
  Hispanic Studies
  PhD, University of Chicago, 1976

- Misemer, Sarah M, Associate Professor
  Hispanic Studies
  PhD, University of Kansas, 2001

- Mitchell, Timothy J, Professor
  Hispanic Studies
  PhD, State University of New York at Buffalo, 1986

- Moreiras, Alberto, Professor
  Hispanic Studies
  PhD, University of Georgia, 1987

- Moyna, Maria I, Associate Professor
  Hispanic Studies
  PhD, University of Florida, 2000
Ortega-Aguilar, Dionisio B, Instructional Assistant Professor
Hispanic Studies
PhD, Stanford University, 1986

Quintana, Maria E, Associate Professor
Hispanic Studies
PhD, University of California, Berkeley, 1998

Timmons, Patricia L, Instructional Associate Professor
Hispanic Studies
PhD, University of Texas, Austin, 2004

Vilaros, Teresa M, Professor
Hispanic Studies
PhD, University of Georgia, 1989

Villalobos, Jose P, Associate Professor
Hispanic Studies
PhD, University of California, Irvine, 1998

Majors
• Bachelor of Arts in Spanish (p. 451)

Minors
• Hispanic Studies for Community Engagement Minor (p. 452)
• Spanish Minor (p. 453)

Spanish - BA

A Spanish major provides students with language skills that translate into a practical tool for use in our increasingly bilingual landscape, whether this be Texas, the American Southwest, one of the many urban areas in the U.S. with large Spanish-speaking populations, or beyond our borders where over 400 million Spanish speakers reside. Above the practical aspect of the major, students of Spanish acquire a rich view of the world in which we live. Focusing on analytical and critical thinking, as well as cultural awareness, our students are prepared for graduate studies in Spanish and professional schools (medical, law, business), and for professions in fields such as education, business, human resources, research, government, social service, tourism, journalism, and translation. To enhance their career options, Spanish majors are encouraged to seek out a complementary minor or second major/degree to create even more opportunities after graduation. Similarly, students can also complete an internship that will provide practical hands-on experience.

The Spanish major consists of 33 hours of major coursework plus 38 hours of general supporting electives. The 33 hours are divided into 6 lower division hours (SPAN 201; 202 or 203) plus 27 hours that are equally distributed among Spanish language or linguistics (9 hours), Spanish literature or culture (9 hours), and approved related electives (9 hours). At least 9 of these 27 hours must be in 400-level Spanish courses. The 38 hours of general supporting electives can come from any of the university’s offerings and may be taken as a minor or part of a second major. To underscore the focus on cultural awareness and to support the achievement of increased linguistic proficiency, our major requires a 10-week minimum experience abroad in a Spanish-speaking country. This experience abroad can be in a formal academic setting, through an internship or other comparable environment. For cases where study abroad is not possible, a student may petition that an internship be used instead.

Program Requirements

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<th>Course Code</th>
<th>Course Title</th>
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<tr>
<td>SPAN 201</td>
<td>Intermediate Spanish I</td>
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<tr>
<td>SPAN 202</td>
<td>Intermediate Spanish II</td>
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<tr>
<td>or SPAN 203</td>
<td>Intermediate Spanish for Heritage Speakers</td>
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<td>SPAN 302</td>
<td>Advanced Grammar</td>
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<td>or SPAN 304</td>
<td>or Advanced Grammar for Heritage Speakers</td>
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<td>SPAN 303</td>
<td>Composition and Conversation</td>
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<td>SPAN 306</td>
<td>Business Spanish</td>
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<td>SPAN 310</td>
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<td>SPAN 311</td>
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<td>Century</td>
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<td>SPAN 312</td>
<td>Hispanic Culture and Civilization: 18th Century to Present</td>
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<td>SPAN 320</td>
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<td>SPAN 410</td>
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<td>Contemporary Hispanic Society and Culture</td>
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<td>SPAN 412</td>
<td>Hispanic Writers in the U.S.</td>
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<td>SPAN 413</td>
<td>Hispanic Culture through Art</td>
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<td>SPAN 421</td>
<td>Spanish Language Poetry</td>
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<td>SPAN 445</td>
<td>Cervantes</td>
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<td>Literature</td>
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<td>Select nine semester credit hours from the following:</td>
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<td>SPAN courses (p. 982)</td>
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<td>HISP courses (p. 812)</td>
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<td>HISP-related courses (see HISP-Related Interdisciplinary Courses table)</td>
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College and University Requirements

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<td>ENGL 203</td>
<td>Writing about Literature</td>
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<td>ENGL 210</td>
<td>Technical and Business Writing</td>
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<td>COMM 203</td>
<td>Public Speaking</td>
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<td>COMM 205</td>
<td>Communication for Technical Professions</td>
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<td>COMM 243</td>
<td>Argumentation and Debate</td>
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<td>Creative arts (p. 22)</td>
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</tbody>
</table>
Social and behavioral sciences (p. 23) 6
POLS 206 American National Government 3
POLS 207 State and Local Government 3
American history (p. 23) 6
International and cultural diversity (p. 34) 3
Free Electives 4 39

Total Semester Credit Hours 120

1 See department advisor for list of current options.
2 One course must include a corresponding laboratory.
3 Course may also be used to satisfy any other requirement.
4 Additional SPAN hours may not be used as free electives.

33 hours required. Spanish majors are required to complete a credit-bearing 10-week minimum semester-long study or experience abroad in a Spanish-speaking country. Study abroad options include University-sponsored, reciprocal, affiliated, and independent programs. Selection of location and type of experience abroad should be made in consultation with departmental advisors. For students who are unable to study abroad, an internship may be used instead. This option is available only with prior approval by the Spanish advisor.

HISP-Related Interdisciplinary Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>ANTH 308</td>
<td>Archaeology of Mesoamerica</td>
<td>3</td>
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<tr>
<td>ANTH 445</td>
<td>Studies in African Diaspora</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 336</td>
<td>Life and Literature of the Southwest</td>
<td>3</td>
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<tr>
<td>ENGL 338</td>
<td>American Ethnic Literature</td>
<td>3</td>
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<tr>
<td>HISP 362/</td>
<td>Latino/a Literature</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 362</td>
<td>European Cinema</td>
<td>3</td>
</tr>
<tr>
<td>FILM 405/</td>
<td>Advanced Film</td>
<td>3</td>
</tr>
<tr>
<td>EURO 405</td>
<td>National Cinema History</td>
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<tr>
<td>GEOG 323</td>
<td>Geography of Latin America</td>
<td>3</td>
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<tr>
<td>HISP 201</td>
<td>Current Issues in Hispanic Studies</td>
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<tr>
<td>HISP 204</td>
<td>Spanish and Spanish American Literature in Translation</td>
<td>3</td>
</tr>
<tr>
<td>HISP 205</td>
<td>Don Quixote and The Other arts</td>
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<td>HISP 206</td>
<td>Food in the Hispanic World</td>
<td>3</td>
</tr>
<tr>
<td>HISP 352</td>
<td>Hispanic Literature and Film</td>
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<tr>
<td>HISP 362/</td>
<td>Latino/a Literature</td>
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<tr>
<td>ENGL 362</td>
<td>Borderlands: U.S. and Mexico</td>
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<tr>
<td>HISP 364/</td>
<td>Diversity Lessons from Medieval Spain</td>
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<tr>
<td>RELS 364</td>
<td>Mexican-American Frontier to 1848</td>
<td>3</td>
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<tr>
<td>HIST 305</td>
<td>Mexican-American History 1848-Present</td>
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<tr>
<td>HIST 307</td>
<td>Latino Communities of the U.S.</td>
<td>3</td>
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<tr>
<td>HIST 319</td>
<td>U.S. Immigration and Ethnicity</td>
<td>3</td>
</tr>
<tr>
<td>HIST 321</td>
<td>The Age of Revolution in the Atlantic World</td>
<td>3</td>
</tr>
<tr>
<td>HIST 322</td>
<td>History of the Iberian World</td>
<td>3</td>
</tr>
<tr>
<td>HIST 326</td>
<td>History of the Caribbean to Emancipation</td>
<td>3</td>
</tr>
<tr>
<td>HIST 341</td>
<td>Latin America to 1810</td>
<td>3</td>
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<tr>
<td>HIST 342</td>
<td>Latin America Since 1810</td>
<td>3</td>
</tr>
<tr>
<td>HIST 343</td>
<td>Inter-American Relations</td>
<td>3</td>
</tr>
<tr>
<td>HIST 440</td>
<td>Latin American Cultural and Intellectual History</td>
<td>3</td>
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<tr>
<td>HIST 441</td>
<td>History of Mexico, 1821 to the Present</td>
<td>3</td>
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<tr>
<td>HIST 449</td>
<td>History of Brazil, 1822 to the Present</td>
<td>3</td>
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<tr>
<td>HLTH 236</td>
<td>Race, Ethnicity and Health</td>
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<td>IBUS 459</td>
<td>Latin American Markets</td>
<td>3</td>
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<tr>
<td>INST 332</td>
<td>Second Language Instruction and Assessment</td>
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<td>INST 334</td>
<td>Assessment of English Language Learners</td>
<td>3</td>
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<tr>
<td>PHIL 283</td>
<td>Latin American Philosophy</td>
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<tr>
<td>POLS 304</td>
<td>Latino Politics in the United States</td>
<td>3</td>
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<tr>
<td>POLS 323</td>
<td>Political Systems of Latin America</td>
<td>3</td>
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<td>POLS 362</td>
<td>Latin American Political Thought</td>
<td>3</td>
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<td>POLS 423</td>
<td>U.S.-Latin American Relations</td>
<td>3</td>
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<td>SOCI 317/</td>
<td>Racial and Ethnic Relations</td>
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<td>AFST 317</td>
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<td>SOCI 337</td>
<td>International Migration</td>
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<tr>
<td>SOCI 403</td>
<td>Sociology of Latinos</td>
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<tr>
<td>SOCI 404/</td>
<td>Sociology of the Community</td>
<td>3</td>
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<tr>
<td>RPTS 404</td>
<td></td>
<td></td>
</tr>
<tr>
<td>THAR 201</td>
<td>Introduction to World Theatre</td>
<td>3</td>
</tr>
</tbody>
</table>

Any course, including 489 Special Topics, with 33% Hispanic focus

Hispanic Studies for Community Engagement - Minor

The minor in Hispanic Studies for Community Engagement offers students the opportunity to combine advanced Spanish language skills and Hispanic cultural knowledge with an internship or service learning experience. This minor is a perfect complement to degrees in other disciplines and it allows for courses taught in English that address themes from throughout the Hispanic world. Coursework for this minor consists of 18 hours: 6 hours in 300- to 400-level Spanish courses; 9 hours from relevant courses in Anthropology, English, Hispanic Studies, History, Philosophy, Political Science, or Sociology; and 3 hours in the form of an internship or service learning experience with a Hispanic-serving public or private institution. Of the total required hours, at least 9 must be taken in residence at Texas A&M.

Program Requirements

Spanish requirement
Select from the following: 6
- SPAN 302 Advanced Grammar
- SPAN 303 Composition and Conversation
- SPAN 304 Advanced Grammar for Heritage Speakers
- SPAN 350 Phonetics

Electives 1
Select from the following: 9
- ANTH 308 Archaeology of Mesoamerica
- ENGL 336 Life and Literature of the Southwest
- ENGL 338 American Ethnic Literature
- ENGL 362 Latino/a Literature
- HISP 362
### Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>SPAN 201</td>
<td>Intermediate Spanish I</td>
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<tr>
<td>SPAN 202</td>
<td>Intermediate Spanish II</td>
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<tr>
<td>or SPAN 203</td>
<td>or Intermediate Spanish for Heritage Speakers</td>
<td>3</td>
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<tr>
<td>SPAN 200-499 (p. 982)</td>
<td>3</td>
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<tr>
<td>SPAN 300-499 (p. 982)</td>
<td>9</td>
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</tbody>
</table>

**Total Semester Credit Hours** 18

1 No more than 6 hours from one area and at least 6 hours must be 300-400 level.

Students must make a grade of C or better in minor courses.

### Spanish - Minor

The Spanish minor allows students with other majors to work on their linguistic skills while they gain Hispanic cultural competency. A great way to complement coursework in many other majors, including those in science, health, and business, this minor focuses on language-based coursework that will serve as an asset upon entering the job market after graduation. The minor requires 18 hours of course work beyond 100-level Spanish courses including Spanish 201; 202 or 203. The remaining 12 hours may be selected from the many 300- and 400-level courses offered every semester. Of the total required hours, at least 9 must be taken in residence at Texas A&M.

At least 9 of these 18 hours must be taken at Texas A&M. A grade of C or higher is required for a course to be counted in the minor field. A minor must be declared before the student has completed 75 credit hours.

### Department of History

The Department of History at Texas A&M offers the B.A., M.A., and Ph.D. The faculty teach over one hundred undergraduate courses on peoples, ideas, and cultures from around the world and across the ages, and are devoted to developing students’ critical thinking, reading, and writing skills. A major in history affords students both a broad education and valuable practical skills. By acquiring familiarity with people in diverse times, places and circumstances, students of history develop a sophisticated human empathy which is the key to good scholarship and good citizenship alike.

Many students rely upon a major in history as preparation for a career in teaching as well as graduate study in law, business, public administration, international relations and theology. A small number pursue graduate degrees in history itself. Other history majors seek postgraduate employment in business management, advertising and public relations, government service, museum and archival work, editorial and publishing work, park interpretation and administration, non-profit organizations, and professions requiring research and bibliographic skills.

### Faculty

- Adams, Ralph J, Distinguished Professor
  History
  PhD, University of California, Santa Barbara, 1972
- Alonzo, Armando C, Associate Professor
  History
  PhD, Indiana University, 1994
- Alperntarlow, Sara, Associate Professor
  History
  PhD, University of Maryland, 1978
- Anderson, Terry H, Professor
  History
  PhD, Indiana University, 1978
- Blanton, Carlos K, Associate Professor
  History
  PhD, Rice University, 1999
- Boulton, Cynthia A, Professor
  History
  PhD, State University of New York at Binghamton, 1985
- Bradford, James C, Professor
  History
  PhD, University of Virginia, 1976
- Brooks, Charles E, Associate Professor
  History
  PhD, University at Buffalo, State University of New York, 1988
- Broussard, Albert S, Professor
  History
  DVM, Duke University, 1977
  PhD, Duke University, 1977
Buenger, Walter L, Professor
History
PhD, Rice University, 1979

Collopy, William F, Lecturer
History
PhD, Texas A&M University, 2011

Coopersmith, Jonathan, Associate Professor
History
PhD, University of Oxford, 1985

Dawson, Joseph G, Professor
History
PhD, Louisiana State University, 1978

Dror, Olga, Associate Professor
History
PhD, Cornell University, 2003

Dunlap, Thomas R, Professor
History
PhD, University of Wisconsin-Madison, 1975

Dunning, Chester S, Professor
History
PhD, Boston College, 1976

Emre, Side, Assistant Professor
History
PhD, University of Chicago, 2009

Foote, Lorien L, Professor
History
PhD, University of Oklahoma, 1999

Haefeli, Evan P, Associate Professor
History
PhD, Princeton University, 2000

Hatfield, April L, Associate Professor
History
PhD, John Hopkins University, 1997

Hernandez, Sonia, Associate Professor
History
PhD, University of Houston, 2006

Hinojosa, Felipe, Associate Professor
History
PhD, University of Houston, 2009

Hudson, Angela P, Associate Professor
History
PhD, Yale University, 2007

Hudson, David R, Instructional Associate Professor
History
PhD, Texas A&M University, 1998

Johnson, Violet M, Professor
History
PhD, Boston College, 1992

Kamphoefner, Walter D, Professor
History
PhD, University of Missouri, 1978

Kim, Hoi-Eun, Associate Professor
History
PhD, Harvard University, 2006

Kirkendall, Andrew J, Professor
History
PhD, University of North Carolina at Chapel Hill, 1996

Lenihan, John H, Associate Professor
History
PhD, University of Maryland, 1976

Linn, Brian M, Professor
History
PhD, Ohio State University, 1985

Livesay, Harold C, Professor
History
PhD, John Hopkins University, 1970

McInnis, Verity G, Lecturer
History
PhD, Texas A&M University, 2012

Parker, Jason C, Associate Professor
History
PhD, University of Florida, 2002

Reese, Roger R, Professor
History
PhD, University of Texas, Austin, 1990
MA, University of Texas at Austin, The, 1986

Resch, Robert P, Associate Professor
History
PhD, University of California, Davis, 1985

Rosenheim, James M, Professor
History
PhD, Princeton University, 1981

Rouleau, Brian J, Assistant Professor
History
PhD, University of Pennsylvania, 2010

Schloss, Rebecca H, Associate Professor
History
PhD, Duke University, 2003

Schwartz, Daniel L, Assistant Professor
History
PhD, Princeton University, 2009

Seipp, Adam R, Professor
History
PhD, University of North Carolina at Chapel Hill, 2005

Smith, Philip M, Instructional Assistant Professor
History
PhD, Texas A&M University, 2007
Starks, Ernest K, Professor  
History  
PhD, University of Houston, 1996

Stranges, Anthony N, Associate Professor  
History  
PhD, University of Wisconsin-Madison, 1977

Unterman, Katherine R, Assistant Professor  
History  
PhD, Yale University, 2011

Vaught, David J, Professor  
History  
PhD, University of California, Davis, 1997

Wang, Di, Professor  
History  
PhD, John Hopkins University, 1999

Wood, Julia E, Assistant Professor  
History  
PhD, Yale University, 2011

Yarak, Larry W, Associate Professor  
History  
PhD, Northwestern University, 1983

Majors
- Bachelor of Arts in History (p. 455)

Minors
- History Minor (p. 456)

History - BA

In fulfilling the requirements for a Bachelor of Arts degree in History, students must meet the general degree requirements of the College of Liberal Arts and the special requirements listed in the college section.

Teacher Certification

Students wishing to meet certification requirements to teach history or social studies in the secondary schools of Texas should contact the College of Education and Human Development for more complete information about the certification options available at Texas A&M University. To be eligible for these options, students must also consult with, and have approval of, their field advisor in the Department of History.

Program Requirements

History Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIST 101</td>
<td>Western Civilization to 1660</td>
<td>3</td>
</tr>
<tr>
<td>HIST 102</td>
<td>Western Civilization Since 1660</td>
<td>3</td>
</tr>
<tr>
<td>HIST 105</td>
<td>History of the United States</td>
<td>3</td>
</tr>
<tr>
<td>HIST 106</td>
<td>History of the United States</td>
<td>3</td>
</tr>
<tr>
<td>HIST 280</td>
<td>The Historian's Craft ¹</td>
<td>3</td>
</tr>
<tr>
<td>HIST 481</td>
<td>Seminar in History ¹</td>
<td>3</td>
</tr>
<tr>
<td>History elective (p. 814) ²</td>
<td>15</td>
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</table>

College and University Requirements

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<tr>
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<th>Credit</th>
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<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following:

- ENGL 203 Writing about Literature  
- ENGL 210 Technical and Business Writing  
- COMM 203 Public Speaking  
- COMM 205 Communication for Technical Professions  
- COMM 243 Argumentation and Debate  
- Literature in English (p. 405)  
- Foreign language (p. 405)  
- Mathematics (p. 860)  
- Select one of the following:
  - MATH course (p. 860)
  - PHIL 240 Introduction to Logic  
  - PHIL 341 Symbolic Logic  
  - PHIL 342 Symbolic Logic II  
- Life and physical sciences (p. 20)  
- Language, philosophy and culture (p. 21)  
- Creative arts (p. 22)  
- Language, philosophy and culture or creative arts (p. 21)  
- Social and behavioral science (p. 23)  
- POLS 206 American National Government  
- POLS 207 State and Local Government  
- International and cultural diversity (p. 34) ³

Free electives (including minor)  
25

Total Semester Credit Hours  
120

¹ Writing-intensive course.  
² At least 12 hours at the 300- and 400-level. At least 3 hours of pre-modern history and at least 3 hours from three of the five lists (United States; Europe; Latin America and Caribbean; Africa, Asia and the Middle East; Thematic).  
³ Course may also be used to satisfy other requirements.

Students should plan a program of study in consultation with one of the department’s undergraduate advisors.

33 credits. Students must take not less than 15 credit hours at upper level for history residency requirement. A grade of C or higher is required for a course to be counted in the major field. A student must complete not less than 18 hours of coursework in history at Texas A&M University.

Minor Field of Study

All history majors are encouraged to select a minor field of study from departments or divisions within or outside of the College of Liberal Arts or in a particular area of interest (as in the case of interdisciplinary minors or career opportunity minors). The minor will consist of a minimum of 15 hours of coursework, as defined by the minor department. A grade of C or higher is required for a course to be counted in the minor field. Interdisciplinary minors (p. 412) such as Women’s and Gender Studies, Africana Studies, Classical Studies, Religious Studies, Film Studies, Latina/o and Mexican American Studies, and Business have specific requirements; students should consult undergraduate advisors in these areas of study. A second major may substitute for the minor. Courses used to meet the minor requirements may not be used in the major. See also the statement on “Minor Field of Study” under the general requirements (p. 405) of the College of Liberal Arts.
History - Minor

To apply for a history minor, a student needs to consult with one of the undergraduate advisors in the Department of History.

Program Requirements

Lower-level requirement
Select two from the following: 6
- HIST 100 - HIST 289 (p. 814)

Upper-level requirement
Select three from the following: 9
- HIST 300 - HIST 489 (p. 814)

Total Semester Credit Hours 15

Students must make a grade of "C" or better in all courses.

Department of International Studies

The Department of International Studies offers diverse curricula that immerse students in the social, political, economic, and cultural implications of globalization. The degree combines a linguistic and cultural proficiency with a flexible set of tracks and a mandatory abroad experience. In addition to the BA in International Studies, the department offers Modern Language BA degree options in French, German, and Russian, as well as a BA in Classics. Students looking for language minors can find them in Arabic, Chinese, Classical Studies, French, German, Italian, Japanese, and Russian. We also offer minors in Asian Studies and Comparative Cultural Studies. The programs give students a combination of measurable language proficiency and a global perspective that will serve both their professional and personal ambitions.

Required Foreign Language Placement Test. Incoming students who intend to enroll for the first time in any language course at Texas A&M University, who have previous knowledge, however acquired, of the language in which they plan to enroll, and who have no college credit in the language, must take the departmental placement examination to determine the appropriate course for their level of ability. The placement test also serves as a basis for credit by examination. The placement examination will be administered by the Department of International Studies during freshman conferences along with other credit by exam tests. The test will also be offered during Fall and Spring semesters. Students who take the Advanced Placement (AP) test or other acceptable tests which grant college-level credit in their foreign language of choice do not have to take the required departmental placement test. In this case, the AP and Achievement test results may be used for placement.

International students whose native language is not English are exempted from satisfying the University foreign language requirement. These students are not allowed to register in those courses in their native language that are used to fulfill that requirement.

Majors

- Bachelor of Arts in Classics, Classical Civilization Track (p. 456)
- Bachelor of Arts in Classics, Language and Literature Track (p. 457)
- Bachelor of Arts in International Studies, Global Cultural Studies Track (p. 464)

- Bachelor of Arts in International Studies, International Commerce Track (p. 458)
- Bachelor of Arts in International Studies, International Communication and Media Track (p. 459)
- Bachelor of Arts in International Studies, International Environmental Studies Track (p. 461)
- Bachelor of Arts in International Studies, International Geographic Information Systems Track (p. 463)
- Bachelor of Arts in International Studies, International Politics and Diplomacy Track (p. 466)
- Bachelor of Arts in Modern Languages, French Option (p. 469)
- Bachelor of Arts in Modern Languages, German Option (p. 470)
- Bachelor of Arts in Modern Language, Russian Option (p. 471)

5-Year Degree Program

- Bachelor of Arts in International Studies and Master of International Affairs (p. 467)

Minors

- Arabic Studies Minor (p. 472)
- Asian Studies Minor (p. 472)
- Chinese Minor (p. 473)
- Classical Studies Minor (p. 473)
- French Minor (p. 474)
- German Minor (p. 474)
- Italian Minor (p. 474)
- Japanese Minor (p. 474)
- Russian Minor (p. 475)

Classics - BA, Classical Civilization Track

The B.A. in Classics is designed to give students a thorough grounding in the culture, history, literature, and intellectual accomplishments of Ancient Greece and Rome from the Bronze Age to the dawn of the Middle Ages. Studying the history and literature of these civilizations will not only help students to develop skills in close reading, writing, and critical thinking, but will also help them to see how fundamental concepts of Western Civilization such as rationalism and democracy first arose in Classical Antiquity. The Classics degree is divided into two tracks: the Literature and Language track has a traditional focus on Latin and Greek philology (students choose either Latin or Greek to specialize in, but are encouraged to take both) and is intended to enable students to read and enjoy the great texts of Classical Antiquity (Homer, Herodotus, Thucydides, Livy, Tacitus, the New Testament, etc.) in the original languages. The Classical Civilization track has no language requirement and focuses instead on the history, beliefs, and material culture of ancient Greek and Roman civilization. A major in Classics signals a commitment to serious intellectual inquiry and is an excellent basis for careers in law, business, consulting, public service, and teaching. Those intending to pursue careers in medicine or finance will also find that a major in Classics can be easily combined with undergraduate courses required for those fields.

Program Requirements

Foundational Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CLAS 410</td>
<td>Seminar in Classical Studies</td>
<td>3</td>
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</tbody>
</table>
Electives

Select seven of the following: 21

- ANTH 316 Nautical Archaeology
- ANTH 317/RELS 317 Introduction to Biblical Archaeology
- CLAS 220 History of Christianity: Origins to the Reformation
- CLAS 250-CLAS 499 (p. 685)
- PHIL 410 Classical Philosophy
- PHIL 411 Medieval Philosophy

Choose two of the following: 6

- ANTH 300-ANTH 499 (p. 625)
- ARCH 430 History of Ancient Architecture
- ARCH 434 The Role of Sculpture and Painting in Ancient Architecture
- CLAS 220 History of Christianity: Origins to the Reformation
- CLAS 250-CLAS 499 (p. 685)
- HIST 300-HIST 499 (p. 814)
- HUMA 303/RELS 303 Near Eastern Religions

College, University Requirements

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Hours</th>
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<tbody>
<tr>
<td>ENGL 104 Composition and Rhetoric</td>
<td>3</td>
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<tr>
<td>Communication (p. 20)</td>
<td>3</td>
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<tr>
<td>Literature in English (p. 405)</td>
<td>6</td>
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<tr>
<td>Foreign language (p. 405)</td>
<td>14</td>
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<tr>
<td>Mathematics (p. 20) 1</td>
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<tr>
<td>Language, philosophy and culture (p. 21)</td>
<td>3</td>
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<tr>
<td>Creative arts (p. 22)</td>
<td>3</td>
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<tr>
<td>Life and physical sciences (p. 20)</td>
<td>9</td>
</tr>
<tr>
<td>Social and behavioral sciences (p. 23)</td>
<td>6</td>
</tr>
<tr>
<td>American history (p. 23)</td>
<td>6</td>
</tr>
<tr>
<td>POLS 206 American National Government</td>
<td>3</td>
</tr>
<tr>
<td>POLS 207 State and Local Government</td>
<td>3</td>
</tr>
<tr>
<td>International and cultural diversity (p. 34) 2</td>
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</tr>
<tr>
<td>General electives 3 3</td>
<td>24</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 120

1 At least 3 hours must be in MATH. Three hours may be PHIL 240.
2 Courses may be used to satisfy other requirements.
3 Select from any 100-499 courses not used elsewhere, except CLAS 300-499.

Minor Field of Study. All Classics majors are strongly encouraged to select 15-18 hours in a minor field of study. Students must earn a “C” or better in all minor coursework.

Courses cross-listed with other programs cannot be used under different prefixes to fulfill more than one requirement.

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Classics - BA, Language and Literature Track

The B.A. in Classics is designed to give students a thorough grounding in the culture, history, literature, and intellectual accomplishments of Ancient Greece and Rome from the Bronze Age to the dawn of the Middle Ages. Studying the history and literature of these civilizations will not only help students to develop skills in close reading, writing, and critical thinking, but will also help them to see how fundamental concepts of Western Civilization such as rationalism and democracy first arose in Classical Antiquity. The Classics degree is divided into two tracks: the Literature and Language track has a traditional focus on Latin and Greek philology (students choose either Latin or Greek to specialize in, but are encouraged to take both) and is intended to enable students to read and enjoy the great texts of Classical Antiquity (Homer, Herodotus, Thucydides, Livy, Tacitus, the New Testament, etc.) in the original languages. The Classical Civilization track has no language requirement and focuses instead on the history, beliefs, and material culture of ancient Greek and Roman civilization. A major in Classics signals a commitment to serious intellectual enquiry and is an excellent basis for careers in law, business, consulting, public service, and teaching. Those intending to pursue careers in medicine or finance will also find that a major in Classics can be easily combined with undergraduate courses required for those fields.

Program Requirements

Greek or Latin Language

Select Greek language sequence or Latin language sequence 18

Greek

- CLAS 102 Beginning Classical Greek II
- CLAS 211 Intermediate Greek
- CLAS 312 Advanced Classical Greek Poetry
- CLAS 310-CLAS 319 (p. 685)

Latin

- CLAS 122 Beginning Latin II
- CLAS 221 Intermediate Latin I
- CLAS 222 Intermediate Latin II
- CLAS 320-CLAS 329 (p. 685)

Foundational Courses

- CLAS 410 Seminar in Classical Studies 3
- CLAS 491 Research 1

Electives

Select one of the following: 3

- ANTH 316 Nautical Archaeology
- ANTH 317/Introduction to Biblical Archaeology
- RELS 317
- CLAS 250/Classical Mythology
- RELS 251
- CLAS 330-CLAS 381 (p. 685)
- CLAS 415-CLAS 444 (p. 685)
- PHIL 410 Classical Philosophy
- PHIL 411 Medieval Philosophy

Select two of the following: 6

- ANTH 300-ANTH 499 (p. 625)
- ARCH 430 History of Ancient Architecture
ARCH 434  The Role of Sculpture and Painting in Ancient Architecture

CLAS 211  Intermediate Greek
CLAS 220  History of Christianity: Origins to the Reformation
CLAS 221  Intermediate Latin I
CLAS 222  Intermediate Latin II
CLAS 250-CLAS 499 (p. 685)
HIST 300-HIST 499 (p. 814)
HUMA  Near Eastern Religions
303/RELS 303

College, University Requirements
ENGL 104  Composition and Rhetoric 3
Communication (p. 20) 3
Literature in English (p. 405) 6
Language, philosophy and culture (p. 21) 3
Mathematics (p. 20) 6
Creative arts (p. 22) 3
Life and physical sciences (p. 20) 9
Social and behavioral sciences (p. 23) 6
American history (p. 23) 6
POL 206  American National Government 3
POL 207  State and Local Government 3
International and cultural diversity (p. 34) 2
General electives 3 38

Total Semester Credit Hours 120

1 At least 3 hours must be in MATH. Three hours may be PHIL 240.
2 Courses may be used to satisfy other requirements.
3 Select from any 100-499 courses not used elsewhere, except CLAS 300-499.

Minor Field of Study. All Classics majors are strongly encouraged to select 15-18 hours in a minor field of study. Students must earn a "C" or better in all minor coursework.

Courses cross-listed with other programs cannot be used under different prefixes to fulfill more than one requirement.

International Studies - BA, International Commerce Track

Principle objectives
1. To guide students through the complex cultural, social, political, and economic stakes of global interdependence.
2. To assure a measurable proficiency in a foreign language.
3. To assure regional cultural competency through a structured and integrated abroad experience.
4. To provide a historical dimension to current conceptions of globalization.

Curriculum

The degree plan consists of a combination of INTS core courses (15 hours), with electives tailored for each track (18 hours); area studies courses in the region corresponding to the student’s foreign language choice (9 hours); foreign language courses (20 hours); and at least one long semester or 10-week summer study abroad or other approved international program with an emphasis on cultural and linguistic immersion.

International Commerce Track

The International Commerce track combines a basic set of courses in business practice with a broader set of courses in international economic and social theory. Students choose their coursework from a list that spans at least four colleges of the university. It provides students with a well-developed understanding of the interconnectedness of global commercial systems.

Program Requirements

Core Courses
INTS 201  Introduction to International Studies 3
Take three hours of the following:
INTS 205  Current Issues in International Studies (1 hour course to be taken 3 times) 3
Select two of the following:
INTS 400-INTS 480 (p. 837) 6
INTS 485  Directed Studies (no more than 3 hours) 3
INTS 489  Special Topics in... 3
INTS 497  Independent Honors Study 3
INTS 481  Senior Seminar in International Studies 3

Track Courses
Select three of the following:
INTS 201  Introduction to International Studies 3
ACCT 209  Survey of Accounting Principles 1
AGEC 105  Introduction to Agricultural Economics 1
ECON 203  Principles of Economics 1
FINC 409  Survey of Finance Principles 1
ISYS 209  Business Information Systems Concepts 1
MGMT 209  Business, Government and Society 1
MGMT 309  Survey of Management 1
MKTG 409  Principles of Marketing 1
Select three of the following:
AGEC 452  International Trade and Agriculture 1
ECON 320  Economic Development of Europe 1
ECON 324  Comparative Economic Systems 1
ECON 330  Economic Development 1
ECON 425  The Organization of Industry 1
ECON 452  International Trade Theory and Policy 1
GEOG 304  Economic Geography 1
INTS 301  Theories of Globalization 1
INTS 484  Directed Internship 1
SOC 206  Global Social Trends 1
SOC 325/ASIA 325  International Business Behavior 1
SOC 328  Environmental Sociology 1
SOC 423  Globalization and Social Change 1

Area Studies
Select courses from one of the following areas: ²

- Latin America
- Europe
- Africa
- North Africa and the Middle East
- Asia

Foreign Language ³

International Experience Requirement ⁴

College and University Requirements

- ENGL 104 Composition and Rhetoric ³
- Select one of the following:
  - ENGL 203 Writing about Literature
  - ENGL 210 Technical and Business Writing
  - COMM 203 Public Speaking
  - COMM 205 Communication for Technical Professions
  - COMM 243 Argumentation and Debate

- Literature in English (p. 405) ⁶
- Mathematics (p. 860) ⁵
- Language, philosophy and culture (p. 21)
- Creative arts (p. 22)
- Life and physical sciences (p. 20)
- Social and behavioral sciences (p. 23)
- American history (p. 23)
- POLS 206 American National Government
- POLS 207 State and Local Government
- International and cultural diversity (p. 34) ⁶

General electives

Total Semester Credit Hours 120

1. Requirement for the minor in business.
2. Choose courses from an approved list on the INTS website in consultation with an advisor. Courses numbered 485 or 489 that contain significant international content can be taken in any department to meet part of the track or area requirement. Students must obtain International Studies advisor approval before taking the 485 or 489 course.
3. See the Foreign Language paragraph.
4. See the International Experience Requirements paragraph.
5. At least 3 hours must be in MATH. Three hours may be PHIL 240.
6. Courses may be used to satisfy other requirements.

Foreign Language

Students entering International Studies take a placement exam to determine the level of and number of required foreign language courses. Exam results may fulfill a maximum of 14 semester credit hours.

- Students placed in 101 will take 101, 102, 201 and 202 and 6 semester credit hours at the 300- or 400-level.
- Students placed in 102 will take 102, 201 and 202 and 6 semester credit hours at the 300- or 400-level.
- Students placed in 201 will take 201 and 202 and 6 semester credit hours at the 300- or 400-level.

International Experience Requirements

The International Experience must generate at least 3 hours of Texas A&M University credit. Departmental approval is required before travel. Any international experience that does not meet these criteria will not count toward the degree.

- Must be at least one long semester or one 10-week summer approved experience.
- Must be taken after completion of 100- and 200-level language requirement and INTS 201.
- Must be completed before student is eligible to enroll in INTS 481, INTS 491 or INTS 497.
- Must be an immersion experience in the foreign culture and language, which can be satisfied by:
  - An internship at a company, government agency or non-profit operation involving significant use of the foreign language. Three hours of INTS 484 elective credit can be given.
  - Courses taken at a foreign university. Courses may count for Texas A&M University credit with approval of the advisor of the relevant department. These courses cannot apply to the International Studies core. One course must be taken in the foreign language at the 300- or 400-level.
  - Selected Texas A&M University Study Abroad programs which involve intensive cultural and language immersion.
  - A combination of the above to equal the requirement of a long semester or a 10-week summer-approved experience.
- Must be taken outside of the student’s country of origin.
- Must be taken in one foreign country that matches with the foreign language and the area study requirement unless approved by the department head before travel.

Other courses may qualify for the college, university requirements categories. Students should consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts or in the International Studies Degree Program Office. The list incorporates University Core Curriculum requirements. No course can be counted in more than one category, except as allowed in the International and Cultural Diversity Graduation requirement.

International Studies - BA, International Communication and Media Track

The BA in International Studies is a degree offered in the Department of International Studies.

Principle objectives

1. To guide students through the complex cultural, social, political, and economic stakes of global interdependence.
2. To assure a measurable proficiency in a foreign language.
3. To assure regional cultural competency through a structured and integrated abroad experience.
4. To provide a historical dimension to current conceptions of globalization.

Curriculum

The degree plan consists of a combination of INTS core courses (15 hours), with electives tailored for each track (18 hours); area studies courses in the region corresponding to the student's foreign language choice (9 hours); foreign language courses (20 hours); and at least one long semester or 10-week summer study abroad or other approved international program with an emphasis on cultural and linguistic immersion.

International Communication and Media Track

As one of the largest sectors of the American and global economy, communication and media occupy a major role in our private and professional lives. Moreover, this sector of the economy often functions transnationally in a relatively seamless fashion. This track offers a discreet set of courses that provide students with a strong background in how media function in a global setting.

Program Requirements

Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTS 201</td>
<td>Introduction to International Studies</td>
<td>3</td>
</tr>
<tr>
<td>INTS 205</td>
<td>Current Issues in International Studies</td>
<td>3</td>
</tr>
</tbody>
</table>

Select two of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTS 400</td>
<td>Communication, Organizations and Society</td>
<td>3</td>
</tr>
<tr>
<td>INTS 405</td>
<td>Directed Studies</td>
<td>3</td>
</tr>
<tr>
<td>INTS 489</td>
<td>Special Topics in...</td>
<td>3</td>
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</tbody>
</table>

Track courses

Select three of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>COMM 240</td>
<td>Rhetorical Criticism</td>
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<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
<td>3</td>
</tr>
<tr>
<td>COMM 320</td>
<td>Organizational Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 325</td>
<td>Persuasion</td>
<td>3</td>
</tr>
<tr>
<td>COMM 415</td>
<td>New Media and Civil Society</td>
<td>3</td>
</tr>
<tr>
<td>COMM 443</td>
<td>Communication and Conflict</td>
<td>3</td>
</tr>
<tr>
<td>COMM 446</td>
<td>Communication, Organizations and Society</td>
<td>3</td>
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<tr>
<td>ENGL 241</td>
<td>Advanced Composition</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 320</td>
<td>Technical Editing and Writing</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 203</td>
<td>Media Writing I</td>
<td>3</td>
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<tr>
<td>JOUR 303</td>
<td>Media Writing II</td>
<td>3</td>
</tr>
<tr>
<td>MKTG 409</td>
<td>Principles of Marketing</td>
<td>3</td>
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<tr>
<td>PSYC 346</td>
<td>Psychology of Language</td>
<td>3</td>
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</table>

Select three of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>COMM 330</td>
<td>Technology and Human Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 335</td>
<td>Intercultural Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 340</td>
<td>Communication and Popular Culture</td>
<td>3</td>
</tr>
<tr>
<td>COMM 354</td>
<td>Political Economy of Telecommunication</td>
<td>3</td>
</tr>
<tr>
<td>INTS 301</td>
<td>Theories of Globalization</td>
<td>3</td>
</tr>
<tr>
<td>INTS 484</td>
<td>Directed Internship</td>
<td>3</td>
</tr>
</tbody>
</table>

Area Studies

Select courses from one of the following areas:

- Latin America
- Europe
- Africa
- North Africa and the Middle East
- Asia

Foreign Language

Students entering International Studies take a placement exam to determine the level of and number of required foreign language courses. Exam results may fulfill a maximum of 14 semester credit hours.
• Students placed in 101 will take 101, 102, 201 and 202 and 6 semester credit hours at the 300- or 400-level.
• Students placed in 102 will take 102, 201 and 202 and 6 semester credit hours at the 300- or 400-level.
• Students placed in 201 will take 201 and 202 and 6 semester credit hours at the 300- or 400-level.
• Students placed in 202 will take 202 and 6 semester credit hours at the 300- or 400-level.
• Students placing out of 101, 102, 201 and 202 will take 6 semester credit hours at the 300- or 400-level.

International Experience Requirements
The International Experience must generate at least 3 hours of Texas A&M University credit. Departmental approval is required before travel. Any international experience that does not meet these criteria will not count toward the degree.

• Must be at least one long semester or one 10-week summer approved experience.
• Must be taken after completion of 100- and 200-level language requirement and INTS 201.
• Must be completed before student is eligible to enroll in INTS 481, INTS 491 or INTS 497.
• Must be an immersion experience in the foreign culture and language, which can be satisfied by:
  • An internship at a company, government agency or non-profit operation involving significant use of the foreign language. Three hours of INTS 484 elective credit can be given.
  • Courses taken at a foreign university. Courses may count for Texas A&M University credit with approval of the advisor of the relevant department. These courses cannot apply to the International Studies core. One course must be taken in the foreign language at the 300- or 400-level.
  • Selected Texas A&M University Study Abroad programs which involve intensive cultural and language immersion.
  • A combination of the above to equal the requirement of a long semester or a 10-week summer-approved experience.
  • Must be taken outside of the student’s country of origin.
  • Must be taken in one foreign country that matches with the foreign language and the area study requirement unless approved by the department head before travel.

Other courses may qualify for the college, university requirements categories. Students should consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts or in the International Studies Degree Program Office. The list incorporates University Core Curriculum requirements. No course can be counted in more than one category, except as allowed in the International and Cultural Diversity Graduation requirement.

International Studies - BA, Environmental Studies Track

Principle objectives
1. To guide students through the complex cultural, social, political, and economic stakes of global interdependence.
2. To assure a measurable proficiency in a foreign language.
3. To assure regional cultural competency through a structured and integrated abroad experience.
4. To provide a historical dimension to current conceptions of globalization.

Curriculum
The degree plan consists of a combination of INTS core courses (15 hours), with electives tailored for each track (18 hours); area studies courses in the region corresponding to the student’s foreign language choice (9 hours); foreign language courses (20 hours); and at least one long semester or 10-week summer study abroad or other approved international program with an emphasis on cultural and linguistic immersion.

International Environmental Studies Track
Globalization and rapid industrialization have brought about a set of environmental concerns that defy national boundaries. Students will work through a fascinating array of coursework chosen among the Colleges of Geoscience, Science, AgriLife, and Liberal Arts. Ultimately students will have a firm grasp of the myriad environmental issues that arise from our global interconnectedness.

Program Requirements

Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTS 201</td>
<td>Introduction to International Studies</td>
<td>3</td>
</tr>
<tr>
<td>INTS 205</td>
<td>Current Issues in International Studies</td>
<td>3</td>
</tr>
<tr>
<td>INTS 400-INTS 480 (p. 837)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>INTS 485</td>
<td>Directed Studies (no more than 3 hours)</td>
<td></td>
</tr>
<tr>
<td>INTS 489</td>
<td>Special Topics in...</td>
<td></td>
</tr>
<tr>
<td>INTS 497</td>
<td>Independent Honors Study</td>
<td></td>
</tr>
<tr>
<td>INTS 481</td>
<td>Senior Seminar in International Studies</td>
<td>3</td>
</tr>
</tbody>
</table>

Track Courses

Select six of the following programs from at least two departments: 18

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGEC 105</td>
<td>Introduction to Agricultural Economics</td>
</tr>
<tr>
<td>AGEC 350</td>
<td>Environmental and Natural Resource Economics</td>
</tr>
<tr>
<td>AGEC 414</td>
<td>Agribusiness and Food Market Analysis</td>
</tr>
<tr>
<td>AGEC 452</td>
<td>International Trade and Agriculture</td>
</tr>
<tr>
<td>AGLS 101</td>
<td>Modern Agricultural Systems and Renewable Resources</td>
</tr>
<tr>
<td>BESC 201</td>
<td>Introduction to Bioenvironmental Sciences</td>
</tr>
<tr>
<td>BIOL 328</td>
<td>Plants and People</td>
</tr>
<tr>
<td>BIOL 357</td>
<td>Ecology</td>
</tr>
<tr>
<td>FSTC 201</td>
<td>Food Science</td>
</tr>
<tr>
<td>GEOG 201</td>
<td>Introduction to Human Geography</td>
</tr>
<tr>
<td>GEOG 202</td>
<td>Geography of the Global Village</td>
</tr>
<tr>
<td>GEOG 203</td>
<td>Planet Earth</td>
</tr>
<tr>
<td>GEOG 304</td>
<td>Economic Geography</td>
</tr>
<tr>
<td>GEOG 311</td>
<td>Cultural Geography</td>
</tr>
<tr>
<td>GEOG 324</td>
<td>Global Climatic Regions</td>
</tr>
<tr>
<td>GEOG 330</td>
<td>Resources and the Environment</td>
</tr>
<tr>
<td>GEOG 401</td>
<td>Political Geography</td>
</tr>
<tr>
<td>GEOG 430</td>
<td>Environmental Justice</td>
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</tbody>
</table>
GEOL 101 Principles of Geology
GEOL 420 Environmental Geology
GEOS 410 Global Change
INTS 301 Theories of Globalization
INTS 484 Directed Internship
OCNG 251 Oceanography
PHIL 314 Environmental Ethics
POLS 347 Politics of Energy and the Environment
POLS 456 Environmental Political Theory
RENR 205 Fundamentals of Ecology
RENR 375 Conservation of Natural Resources
SOCI 206 Global Social Trends
SOCI 328 Environmental Sociology

Areas Studies
Select courses from one of the following areas: 1
Latin America
Europe
Africa
North Africa and the Middle East
Asia
Foreign Language 2

International Experience Requirement 3

College and University Requirements
ENGL 104 Composition and Rhetoric 3
Select one of the following:
ENGL 203 Writing about Literature
ENGL 210 Technical and Business Writing
COMM 203 Public Speaking
COMM 205 Communication for Technical Professions
COMM 243 Argumentation and Debate

Literature in English (p. 405) 6
Mathematics (p. 20) 4
Language, philosophy and culture (p. 21) 3
Creative arts (p. 22) 3
Life and physical sciences (p. 20) 9
Social and behavioral sciences (p. 23) 6
American history (p. 23) 6
POLS 206 American National Government 3
POLS 207 State and Local Government 3
International and cultural diversity (p. 34) 5

General electives 7

Total Semester Credit Hours 120

1 Choose courses from an approved list on the INTS website in consultation with an advisor. Courses numbered 485 or 489 that contain significant international content can be taken in any department to meet part of the track or area requirement. Students must obtain International Studies advisor approval before taking the 485 or 489 course.
2 See the Foreign Language paragraph.
3 See the International Experience Requirements paragraph.

Foreign Language
Students entering International Studies take a placement exam to determine the level of and number of required foreign language courses. Exam results may fulfill a maximum of 14 semester credit hours.

• Students placed in 101 will take 101, 102, 201 and 202 and 6 semester credit hours at the 300- or 400-level.
• Students placed in 102 will take 102, 201 and 202 and 6 semester credit hours at the 300- or 400-level.
• Students placed in 201 will take 201 and 202 and 6 semester credit hours at the 300- or 400-level.
• Students placed in 202 will take 202 and 6 semester credit hours at the 300- or 400-level.
• Students placing out of 101, 102, 201 and 202 will take 6 semester credit hours at the 300- or 400-level.

International Experience Requirements
The International Experience must generate at least 3 hours of Texas A&M University credit. Departmental approval is required before travel. Any international experience that does not meet these criteria will not count toward the degree.

• Must be at least one long semester or one 10-week summer approved experience.
• Must be taken after completion of 100- and 200-level language requirement and INTS 201.
• Must be completed before student is eligible to enroll in INTS 481, INTS 491 or INTS 497.
• Must be an immersion experience in the foreign culture and language, which can be satisfied by:
  • An internship at a company, government agency or non-profit operation involving significant use of the foreign language. Three hours of INTS 484 elective credit can be given.
  • Courses taken at a foreign university. Courses may count for Texas A&M University credit with approval of the advisor of the relevant department. These courses cannot apply to the International Studies core. One course must be taken in the foreign language at the 300- or 400-level.
  • Selected Texas A&M University Study Abroad programs which involve intensive cultural and language immersion.
  • A combination of the above to equal the requirement of a long semester or a 10-week summer-approved experience.
• Must be taken outside of the student’s country of origin.
• Must be taken in one foreign country that matches with the foreign language and the area study requirement unless approved by the department head before travel.

Other courses may qualify for the college, university requirements categories. Students should consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts or in the International Studies Degree Program Office. The list incorporates University Core Curriculum requirements. No course can be counted in more than one category, except as allowed in the International and Cultural Diversity Graduation requirement.
International Studies - BA, International Geographic Information Systems Track

**Principle objectives**

1. To guide students through the complex cultural, social, political, and economic stakes of global interdependence.
2. To assure a measurable proficiency in a foreign language.
3. To assure regional cultural competency through a structured and integrated abroad experience.
4. To provide a historical dimension to current conceptions of globalization.

**Curriculum**

The degree plan consists of a combination of INTS core courses (15 hours), with electives tailored for each track (18 hours); area studies courses in the region corresponding to the student's foreign language choice (9 hours); foreign language courses (20 hours); and at least one long semester or 10-week summer study abroad or other approved international program with an emphasis on cultural and linguistic immersion.

**International Geographic Information Systems Track**

The International Geographic Information Systems track adds a tremendous skill set to the already substantial ones offered by the core INTS major. The International GIS track immerses students in the workings of spatially distributed information that is used in the environmental, transportation, defense, and many other sectors of the economy. Students will develop skills in spatial analysis and advanced applications of GIS technologies.

**Program Requirements**

**Core Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTS 201</td>
<td>Introduction to International Studies</td>
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</table>

Take three hours of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>INTS 205</td>
<td>Current Issues in International Studies (1 hour course to be taken 3 times)</td>
<td>3</td>
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</table>

Select two of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>INTS 400-INTS 480 (p. 837)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>INTS 485</td>
<td>Directed Studies (no more than 3 hours)</td>
<td>3</td>
</tr>
<tr>
<td>INTS 489</td>
<td>Special Topics in...</td>
<td>3</td>
</tr>
<tr>
<td>INTS 497</td>
<td>Independent Honors Study</td>
<td>3</td>
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</table>

INTS 481  Senior Seminar in International Studies 3

**Track Courses**

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>GEOG 203</td>
<td>Planet Earth</td>
<td>3</td>
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<tr>
<td>GEOG 205</td>
<td>Environmental Change</td>
<td>3</td>
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Select one of the following:

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<thead>
<tr>
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<th>Title</th>
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<tbody>
<tr>
<td>GEOG 320</td>
<td>The Middle East</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 323</td>
<td>Geography of Latin America</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 325</td>
<td>Geography of Europe</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 361</td>
<td>Remote Sensing in Geosciences</td>
<td>4</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 390</td>
<td>Principles of Geographic Information Systems</td>
<td>4</td>
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<tr>
<td>GEOG 475</td>
<td>Advanced Topics in GIS (Geographic Information Systems)</td>
<td>4</td>
</tr>
</tbody>
</table>

**Area Studies**

Select courses from one of the following areas:

<table>
<thead>
<tr>
<th>Region</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latin America</td>
<td>9</td>
</tr>
<tr>
<td>Africa</td>
<td>9</td>
</tr>
<tr>
<td>North Africa and the Middle East</td>
<td>9</td>
</tr>
<tr>
<td>Asia</td>
<td>9</td>
</tr>
</tbody>
</table>

Foreign Language 20

**International Experience Requirement**

**College and University Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
<td>3</td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>COMM 205</td>
<td>Communication for Technical Professions</td>
<td>3</td>
</tr>
<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
<td>6</td>
</tr>
</tbody>
</table>

**Literature in English** (p. 405) 6

**Mathematics** (p. 20) 4

**Language, philosophy and culture** (p. 21) 3

**Creative arts** (p. 22) 3

**Life and physical sciences** (p. 20) 9

**Social and behavioral sciences** (p. 23) 6

**American history** (p. 23) 6

**POLS 206 | American National Government | 3            |
| POLS 207 | State and Local Government | 3            |

**International and cultural diversity** (p. 34) 5

**General electives** 7

**Total Semester Credit Hours** 120

---

1. Choose courses from an approved list on the INTS website in consultation with an advisor. Courses numbered 485 or 489 that contain significant international content can be taken in any department to meet part of the track or area requirement. Students must obtain International Studies advisor approval before taking the 485 or 489 course.
2. See the Foreign Language paragraph.
3. See the International Experience Requirements paragraph.
4. At least 3 hours must be in MATH. Three hours may be PHIL 240.
5. Courses may be used to satisfy other requirements.

**Foreign Language**

Students entering International Studies take a placement exam to determine the level of and number of required foreign language courses. Exam results may fulfill a maximum of 14 semester credit hours.

- Students placed in 101 will take 101, 102, 201 and 202 and 6 semester credit hours at the 300- or 400-level.
- Students placed in 102 will take 102, 201 and 202 and 6 semester credit hours at the 300- or 400-level.
• Students placed in 201 will take 201 and 202 and 6 semester credit hours at the 300- or 400-level.
• Students placed in 202 will take 202 and 6 semester credit hours at the 300- or 400-level.
• Students placing out of 101, 102, 201 and 202 will take 6 semester credit hours at the 300- or 400-level.

International Experience Requirements
The International Experience must generate at least 3 hours of Texas A&M University credit. Departmental approval is required before travel. Any international experience that does not meet these criteria will not count toward the degree.

• Must be at least one long semester or one 10-week summer approved experience.
• Must be taken after completion of 100- and 200-level language requirement and INTS 201.
• Must be completed before student is eligible to enroll in INTS 481, INTS 491 or INTS 497.
• Must be an immersion experience in the foreign culture and language, which can be satisfied by:
  • An internship at a company, government agency or non-profit operation involving significant use of the foreign language. Three hours of INTS 484 elective credit can be given.
  • Courses taken at a foreign university. Courses may count for Texas A&M University credit with approval of the advisor of the relevant department. These courses cannot apply to the International Studies core. One course must be taken in the foreign language at the 300- or 400-level.
  • Selected Texas A&M University Study Abroad programs which involve intensive cultural and language immersion.
  • A combination of the above to equal the requirement of a long semester or a 10-week summer-approved experience.
• Must be taken outside of the student’s country of origin.
• Must be taken in one foreign country that matches with the foreign language and the area study requirement unless approved by the department head before travel.

Other courses may qualify for the college, university requirements categories. Students should consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts or in the International Studies Degree Program Office. The list incorporates University Core Curriculum requirements. No course can be counted in more than one category, except as allowed in the International and Cultural Diversity Graduation requirement.

International Studies - BA, Global Cultural Studies Track

Principle objectives
1. To guide students through the complex cultural, social, political, and economic stakes of global interdependence.
2. To assure a measurable proficiency in a foreign language.
3. To assure regional cultural competency through a structured and integrated abroad experience.
4. To provide a historical dimension to current conceptions of globalization.

Curriculum
The degree plan consists of a combination of INTS core courses (15 hours), with electives tailored for each track (18 hours); area studies courses in the region corresponding to the student's foreign language choice (9 hours); foreign language courses (20 hours); and at least one long semester or 10-week summer study abroad or other approved international program with an emphasis on cultural and linguistic immersion.

Global Cultural Studies Track
The Global Cultural Studies track offers students both the fundamental theoretical background in cultural studies as well as a broad array of courses in international cultural production and criticism. This humanities based program provides students with a rich understanding of artistic expression in a global setting.

Program Requirements

Core Courses
INTS 201 Introduction to International Studies 3
Take three hours of the following: 3
INTS 205 Current Issues in International Studies
Select two of the following: 6
INTS 400-INTS 480 (p. 837)
INTS 485 Directed Studies
INTS 489 Special Topics in...
INTS 497 Independent Honors Study
INTS 481 Senior Seminar in International Studies 3

Track Courses
INTS 211/ENGL 211 Foundations in Cultural Studies 3
MODL 222/ENGL 222 World Literature 3
Select one of the following: 3
ANTH 324/ Music in World Cultures
MUSC 324
ANTH 335/ Cultures of Central Asia
ASIA 335
ANTH 340/ Folklore and the Supernatural
RELS 340
ANTH 403/ Anthropology of Religion
RELS 403
ANTH 404/ Women and Culture
WGST 404
ANTH 424 Human Evolutionary Ecology I: Culture, Cooperation and Subsistence
ANTH 440 Studies in Globalization
ANTH 445 Studies in African Diaspora
Select three of the following: 9
AFST 325 Africana Humanities
AFST 326 Africana Popular Culture
ARTS 349 The History of Modern Art
ARCH 430 History of Ancient Architecture
ARCH 434 The Role of Sculpture and Painting in Ancient Architecture
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
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<tr>
<td>CLAS 415/</td>
<td>The Ancient World in Film</td>
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<td>FILM 415</td>
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<td></td>
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<tr>
<td>CLAS 418</td>
<td>European Intellectual History from Ancient Greece</td>
<td></td>
</tr>
<tr>
<td></td>
<td>to the Early Middle Ages</td>
<td></td>
</tr>
<tr>
<td>COMM 335</td>
<td>Intercultural Communication</td>
<td></td>
</tr>
<tr>
<td>COMM 340</td>
<td>Communication and Popular Culture</td>
<td></td>
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<tr>
<td>COMM 365/JOURED 365</td>
<td>International Communication</td>
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<tr>
<td>EURO 300-EURO 489 (p. 777)</td>
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<tr>
<td>GEOG 311</td>
<td>Cultural Geography</td>
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<tr>
<td>HIST 421</td>
<td>European Intellectual History in the Twentieth</td>
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</tr>
<tr>
<td></td>
<td>Century</td>
<td></td>
</tr>
<tr>
<td>INTS 301</td>
<td>Theories of Globalization</td>
<td></td>
</tr>
<tr>
<td>INTS 484</td>
<td>Directed Internship</td>
<td></td>
</tr>
<tr>
<td>MUSC 324/ANTH 324</td>
<td>Music in World Cultures</td>
<td></td>
</tr>
<tr>
<td>MUSC 325/PERF 325</td>
<td>Dance and World Cultures</td>
<td></td>
</tr>
<tr>
<td>PERF 301</td>
<td>Performance in World Cultures</td>
<td></td>
</tr>
<tr>
<td>PHIL 330</td>
<td>Philosophy of Art</td>
<td></td>
</tr>
<tr>
<td>PHIL 331/</td>
<td>Philosophy of Religion</td>
<td></td>
</tr>
<tr>
<td>RELS 331</td>
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<td></td>
</tr>
<tr>
<td>PHIL 371</td>
<td>Philosophy of Literature</td>
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<tr>
<td>PSYC 346</td>
<td>Psychology of Language</td>
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<td>WGST 404/ANTH 404</td>
<td>Women and Culture</td>
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<tr>
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<tr>
<td>Latin America</td>
<td>Select courses from one of the following areas:</td>
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<td>Europe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Africa</td>
<td></td>
<td></td>
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<tr>
<td>North Africa and the Middle East</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asia</td>
<td></td>
<td></td>
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<tr>
<td>Foreign Language</td>
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<tr>
<td>College and University Requirements</td>
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<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
<td></td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td></td>
</tr>
<tr>
<td>COMM 205</td>
<td>Communication for Technical Professions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>COMM 243 Argumentation and Debate</td>
<td></td>
</tr>
<tr>
<td>Literature in English (p. 405)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Mathematics (p. 860)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Language, philosophy and culture (p. 21)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Creative arts (p. 22)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Life and physical sciences (p. 20)</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Social and behavioral sciences (p. 23)</td>
<td></td>
<td>6</td>
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<tr>
<td>American history (p. 23)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
</tr>
<tr>
<td>International and cultural diversity (p. 34)</td>
<td></td>
<td>5</td>
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<tr>
<td>General Electives</td>
<td>7 semester credit hours</td>
<td>7</td>
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<tr>
<td>Total Semester Credit Hours</td>
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<td>120</td>
</tr>
</tbody>
</table>

1. Choose courses from an approved list on the INTS website in consultation with an advisor. Courses numbered 485 or 489 that contain significant international content can be taken in any department to meet part of the track or area requirement. Students must obtain International Studies advisor approval before taking the 485 or 489 course.

2. See the Foreign Language paragraph.

3. See the International Experience Requirements paragraph.

4. At least 3 hours must be in MATH. Three hours may be PHIL 240.

5. Courses may be used to satisfy other requirements.

Foreign Language

Students entering International Studies take a placement exam to determine the level of and number of required foreign language courses. Exam results may fulfill a maximum of 14 semester credit hours.

- Students placed in 101 will take 101, 102, 201 and 202 and 6 semester credit hours at the 300- or 400-level.
- Students placed in 102 will take 102, 201 and 202 and 6 semester credit hours at the 300- or 400-level.
- Students placed in 201 will take 201 and 202 and 6 semester credit hours at the 300- or 400-level.
- Students placed in 202 will take 202 and 6 semester credit hours at the 300- or 400-level.
- Students placing out of 101, 102, 201 and 202 will take 6 semester credit hours at the 300- or 400-level.

International Experience Requirements

The International Experience must generate at least 3 hours of Texas A&M University credit. Departmental approval is required before travel. Any international experience that does not meet these criteria will not count toward the degree.

- Must be at least one long semester or one 10-week summer approved experience.
- Must be taken after completion of 100- and 200-level language requirement and INTS 201.
- Must be completed before student is eligible to enroll in INTS 481, INTS 491 or INTS 497.
- Must be an immersion experience in the foreign culture and language, which can be satisfied by:
  - An internship at a company, government agency or non-profit operation involving significant use of the foreign language. Three hours of INTS 484 elective credit can be given.
  - Courses taken at a foreign university. Courses may count for Texas A&M University credit with approval of the advisor of the relevant department. These courses cannot apply to the International Studies core. One course must be taken in the foreign language at the 300- or 400-level.
• Selected Texas A&M University Study Abroad programs which involve intensive cultural and language immersion.
• A combination of the above to equal the requirement of a long semester or a 10-week summer-approved experience.
• Must be taken outside of the student's country of origin.
• Must be taken in one foreign country that matches with the foreign language and the area study requirement unless approved by the department head before travel.

Other courses may qualify for the college, university requirements categories. Students should consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts or in the International Studies Degree Program Office. The list incorporates University Core Curriculum requirements. No course can be counted in more than one category, except as allowed in the International and Cultural Diversity Graduation requirement.

International Studies - BA, International Politics and Diplomacy Track

Principle objectives
1. To guide students through the complex cultural, social, political, and economic stakes of global interdependence.
2. To assure a measurable proficiency in a foreign language.
3. To assure regional cultural competency through a structured and integrated abroad experience.
4. To provide a historical dimension to current conceptions of globalization.

Curriculum
The degree plan consists of a combination of INTS core courses (15 hours), with electives tailored for each track (18 hours); area studies courses in the region corresponding to the student’s foreign language choice (9 hours); foreign language courses (20 hours); and at least one long semester or 10-week summer study abroad or other approved international program with an emphasis on cultural and linguistic immersion.

International Politics and Diplomacy Track

This track offers students a fundamental understanding of foreign relations. Students learn about the workings of governments and civil societies in a global framework. In the end, students come away from the program with a sound understanding of how governments communicate and cooperate in regional, continental, and global settings.

Program Requirements

Core Courses
INTS 201 Introduction to International Studies 3
Take three hours of the following:
INTS 205 Current Issues in International Studies 3
Select two of the following:
INTS 400-INTS 480 (p. 837) 6
INTS 485 Directed Studies
INTS 489 Special Topics in...

INTS 497 Independent Honors Study
INTS 481 Senior Seminar in International Studies 3

Track Courses
Select six of the following from at least two departments: 18
ECON 203 Principles of Economics
ECON 320 Economic Development of Europe
ECON 324 Comparative Economic Systems
ECON 330 Economic Development
ECON 452 International Trade Theory and Policy
HIST 343 Inter-American Relations
HIST 444 American Military History Since 1901
HIST 462 American Foreign Relations
HIST 463 American Foreign Relations
HIST 464 International Developments Since 1918
INTS 301 Theories of Globalization
INTS 484 Directed Internship
POLS 229 Introduction to Comparative Politics
POLS 231 Introduction to World Politics
POLS 324 Politics of Global Inequality
POLS 328 Globalization and Democracy
POLS 347 Politics of Energy and the Environment
POLS 350 Modern Political Thought
POLS 358 Comparative Judicial Politics
POLS 364 Global Political Thought
POLS 413 American Foreign Policy
POLS 415 Contemporary Issues in American Foreign Policy
POLS 423 U.S.-Latin American Relations
POLS 424 Comparative Governmental Institutions
POLS 429 Issues in World Politics
POLS 432 The Politics of European Union
POLS 447 National Security Policy
POLS 454 Contemporary Political Ideas
POLS 456 Environmental Political Theory
POLS 475 Government and the Economy
SOCI 325/ASIA 325 International Business Behavior
SOCI 423 Globalization and Social Change

Area Studies
Select courses from one of the following areas: 1 9
Latin America
Europe
Africa
North Africa and the Middle East
Asia

Foreign Language
Courses and/or replacement credits 2 20

International Experience Requirement
Experience requires Director of International Studies approval before travel 3

College, University Requirements
ENGL 104 Composition and Rhetoric 3
Select one of the following: 3
ENGL 203 Writing about Literature
ENGL 210 Technical and Business Writing
COMM 203 Public Speaking
COMM 205 Communication for Technical Professions
COMM 243 Argumentation and Debate

Literature in English (p. 405) 6
Mathematics (p. 20) 4 6
Language, philosophy and culture (p. 21) 3
Creative arts (p. 22) 3
Life and physical sciences (p. 20) 9
Social and behavioral sciences (p. 23) 6
American history (p. 23) 6
POLS 206 American National Government 3
POLS 207 State and Local Government 3
International and cultural diversity (p. 34) 5

General Electives 7

Total Semester Credit Hours 120

1 Choose courses from an approved list on the INTS website in consultation with an advisor. Courses numbered 485 or 489 that contain significant international content can be taken in any department to meet part of the track or area requirement. Students must obtain International Studies advisor approval before taking the 485 or 489 course.
2 See the Foreign Language paragraph.
3 See the International Experience Requirements paragraph.
4 At least 3 hours must be in MATH. Three hours may be PHIL 240.
5 Courses may be used to satisfy other requirements.

Foreign Language

Students entering International Studies take a placement exam to determine the level of and number of required foreign language courses. Exam results may fulfill a maximum of 14 semester credit hours.

• Students placed in 101 will take 101, 102, 201 and 202 and 6 semester credit hours at the 300- or 400-level.
• Students placed in 102 will take 102, 201 and 202 and 6 semester credit hours at the 300- or 400-level.
• Students placed in 201 will take 201 and 202 and 6 semester credit hours at the 300- or 400-level.
• Students placed in 202 will take 202 and 6 semester credit hours at the 300- or 400-level.
• Students placing out of 101, 102, 201 and 202 will take 6 semester credit hours at the 300- or 400-level.

International Experience Requirements

The International Experience must generate at least 3 hours of Texas A&M University credit. Departmental approval is required before travel. Any international experience that does not meet these criteria will not count toward the degree.

• Must be at least one long semester or one 10-week summer approved experience.
• Must be taken after completion of 100- and 200-level language requirement and INTS 201.

• Must be completed before student is eligible to enroll in INTS 481, INTS 491 or INTS 497.
• Must be an immersion experience in the foreign culture and language, which can be satisfied by:
  • An internship at a company, government agency or non-profit operation involving significant use of the foreign language. Three hours of INTS 484 elective credit can be given.
  • Courses taken at a foreign university. Courses may count for Texas A&M University credit with approval of the advisor of the relevant department. These courses cannot apply to the International Studies core. One course must be taken in the foreign language at the 300- or 400-level.
  • Selected Texas A&M University Study Abroad programs which involve intensive cultural and language immersion.
  • A combination of the above to equal the requirement of a long semester or a 10-week summer-approved experience.
• Must be taken outside of the student’s country of origin.
• Must be taken in one foreign country that matches with the foreign language and the area study requirement unless approved by the department head before travel.

Other courses may qualify for the college, university requirements categories. Students should consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts or in the International Studies Degree Program Office. The list incorporates University Core Curriculum requirements. No course can be counted in more than one category, except as allowed in the International and Cultural Diversity Graduation requirement.

International Studies - 5-Year Bachelor of Arts and Master of International Affairs

Principle objectives

1. To guide students through the complex cultural, social, political, and economic stakes of global interdependence.
2. To assure a measurable proficiency in a foreign language.
3. To assure regional cultural competency through a structured and integrated abroad experience.
4. To provide a historical dimension to current conceptions of globalization.

Curriculum

The degree plan consists of a combination of INTS core courses (15 hours), with electives tailored for each track (18 hours); area studies courses in the region corresponding to the student’s foreign language choice (9 hours); foreign language courses (20 hours); and at least one long semester or 10-week summer study abroad or other approved international program with an emphasis on cultural and linguistic immersion.

5-Year Bachelor of Arts and Master of International Affairs

The International Studies department, in conjunction with the Bush School of Government & Public Service, offers a joint degree program that allows International Studies majors to enter the Bush School at the
beginning of their fourth year at Texas A&M. This opportunity enables students to receive their International Studies undergraduate degree and a Master of International Affairs (MIA) degree in five years. The partnership between International Studies and the Bush School is especially attractive because all graduates from the Bush School’s Masters Program must have proficiency in a foreign language and are encouraged to spend a semester abroad; International Studies majors will have completed this requirement prior to entering the Bush School graduate program. Students admitted to the five-year degree program will have completed 120 hours of coursework required to receive their bachelor’s degree. These courses must include all of the specific prerequisites for a Bachelor of Arts degree in International Studies (within the Politics and Diplomacy emphasis track), as well as the courses required by the College of Liberal Arts and by Texas A&M University for an undergraduate degree. Students will be required to complete the same two year, 48 hour curriculum as other students admitted to the Bush School’s MPSA program. For information about the 5-year Degree Program, contact the Bush School (http://bush.tamu.edu).

Program Requirements

**Core Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTS 201</td>
<td>Introduction to International Studies</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Take the following course three times.</td>
<td>3</td>
</tr>
<tr>
<td>INTS 205</td>
<td>Current Issues in International Studies</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Select two of the following:</td>
<td>6</td>
</tr>
<tr>
<td>INTS 400-INTS 480 (p. 837)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INTS 485</td>
<td>Directed Studies (no more than 3 hours)</td>
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</tr>
<tr>
<td>INTS 489</td>
<td>Special Topics in...</td>
<td></td>
</tr>
<tr>
<td>INTS 497</td>
<td>Independent Honors Study</td>
<td></td>
</tr>
<tr>
<td>INTS 481</td>
<td>Senior Seminar in International Studies</td>
<td>3</td>
</tr>
</tbody>
</table>

**Supporting Courses**

Select six of the following: 18

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>ECON 203</td>
<td>Principles of Economics</td>
</tr>
<tr>
<td>ECON 320</td>
<td>Economic Development of Europe</td>
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<tr>
<td>ECON 324</td>
<td>Comparative Economic Systems</td>
</tr>
<tr>
<td>ECON 330</td>
<td>Economic Development</td>
</tr>
<tr>
<td>ECON 452</td>
<td>International Trade Theory and Policy</td>
</tr>
<tr>
<td>HIST 343</td>
<td>Inter-American Relations</td>
</tr>
<tr>
<td>HIST 444</td>
<td>American Military History Since 1901</td>
</tr>
<tr>
<td>HIST 462</td>
<td>American Foreign Relations</td>
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<tr>
<td>HIST 463</td>
<td>American Foreign Relations</td>
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<tr>
<td>HIST 464</td>
<td>International Developments Since 1918</td>
</tr>
<tr>
<td>INTS 301</td>
<td>Theories of Globalization</td>
</tr>
<tr>
<td>INTS 484</td>
<td>Directed Internship</td>
</tr>
<tr>
<td>POLS 324</td>
<td>Politics of Global Inequality</td>
</tr>
<tr>
<td>POLS 328</td>
<td>Globalization and Democracy</td>
</tr>
<tr>
<td>POLS 347</td>
<td>Politics of Energy and the Environment</td>
</tr>
<tr>
<td>POLS 350</td>
<td>Modern Political Thought</td>
</tr>
<tr>
<td>POLS 358</td>
<td>Comparative Judicial Politics</td>
</tr>
<tr>
<td>POLS 364</td>
<td>Global Political Thought</td>
</tr>
<tr>
<td>POLS 413</td>
<td>American Foreign Policy</td>
</tr>
<tr>
<td>POLS 415</td>
<td>Contemporary Issues in American Foreign Policy</td>
</tr>
<tr>
<td>POLS 423</td>
<td>U.S.-Latin American Relations</td>
</tr>
<tr>
<td>POLS 424</td>
<td>Comparative Governmental Institutions</td>
</tr>
<tr>
<td>POLS 429</td>
<td>Issues in World Politics</td>
</tr>
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</table>

**POLS 432** The Politics of European Union
**POLS 447** National Security Policy
**POLS 454** Contemporary Political Ideas
**POLS 456** Environmental Political Theory
**POLS 475** Government and the Economy
**SOCI 325** International Business Behavior
**ASIA 325**
**SOCI 423** Globalization and Social Change
**BUSH 601** Leadership and Public Administration
**INTA 606** International Politics in Theory and Practice
**INTA 608** Fundamentals of the Global Economy

**Area Studies**

Select courses from one of the following areas: 1

<table>
<thead>
<tr>
<th>Area</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>ECON 320, HIST 343, INTS 301, POLS 324</td>
</tr>
<tr>
<td>Asia</td>
<td>ECON 324, HIST 444, INTS 301, POLS 328</td>
</tr>
<tr>
<td>Europe</td>
<td>ECON 330, HIST 462, INTS 301, POLS 330</td>
</tr>
<tr>
<td>Latin America</td>
<td>ECON 452, HIST 463, INTS 301, POLS 338</td>
</tr>
<tr>
<td>North Africa and the Middle East</td>
<td>ECON 452, HIST 464, INTS 301, POLS 347</td>
</tr>
</tbody>
</table>

**Foreign Language** 5

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choose courses from an approved list on the INTS website in consultation with an advisor. Courses numbered 485 or 489 that contain significant international content can be taken in any department to meet part of the track or area requirement. Students must obtain International Studies advisor approval before taking the 485 or 489 course.</td>
<td></td>
</tr>
</tbody>
</table>

**International Experience Requirement** 3

**College and University Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Select one of the following:</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
<td></td>
</tr>
<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
<td></td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
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</tr>
<tr>
<td>COMM 205</td>
<td>Communication for Technical Professions</td>
<td></td>
</tr>
<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
<td></td>
</tr>
<tr>
<td>Literature in English (p. 405)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Mathematics (p. 20)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Language, philosophy and culture (p. 21)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Creative arts (p. 22)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Life and physical sciences (p. 20)</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Social and behavioral sciences (p. 23)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>American history (p. 23)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
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<tr>
<td>International and cultural diversity (p. 34)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>General electives</td>
<td>7</td>
<td></td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours** 120

1  Choose courses from an approved list on the INTS website in consultation with an advisor. Courses numbered 485 or 489 that contain significant international content can be taken in any department to meet part of the track or area requirement. Students must obtain International Studies advisor approval before taking the 485 or 489 course.

2  See the Foreign Language paragraph.

3  See the International Experience Requirements paragraph.

4  At least 3 hours must be in MATH. Three hours may be PHIL 240.

5  Courses may be used to satisfy other requirements.
### Foreign Language

Students entering International Studies take a placement exam to determine the level of and number of required foreign language courses. Exam results may fulfill a maximum of 14 semester credit hours.

- Students placed in 101 will take 101, 102, 201 and 202 and 6 semester credit hours at the 300- or 400-level.
- Students placed in 102 will take 102, 201 and 202 and 6 semester credit hours at the 300- or 400-level.
- Students placed in 201 will take 201 and 202 and 6 semester credit hours at the 300- or 400-level.
- Students placed in 202 will take 202 and 6 semester credit hours at the 300- or 400-level.
- Students placing out of 101, 102, 201 and 202 will take 6 semester credit hours at the 300- or 400-level.

### International Experience Requirements

The International Experience must generate at least 3 hours of Texas A&M University credit. Departmental approval is required before travel. **Any international experience that does not meet these criteria will not count toward the degree.** International Experience must be completed prior to admission into the 5-year Degree Program.

- Must be at least one long semester or one 10-week summer approved experience.
- Must be taken after completion of 100- and 200-level language requirement and INTS 201.
- Must be completed before student is eligible to enroll in INTS 481, INTS 491 or INTS 497.
- Must be an immersion experience in the foreign culture and language, which can be satisfied by:
  - An internship at a company, government agency or non-profit operation involving significant use of the foreign language. Three hours of INTS 484 elective credit can be given.
  - Courses taken at a foreign university. Courses may count for Texas A&M University credit with approval of the advisor of the relevant department. These courses cannot apply to the International Studies core. One course must be taken in the foreign language at the 300- or 400-level.
  - Selected Texas A&M University Study Abroad programs which involve intensive cultural and language immersion.
  - A combination of the above to equal the requirement of a long semester or a 10-week summer-approved experience.
  - Must be taken outside of the student's country of origin.
  - Must be taken in one foreign country that matches with the foreign language and the area study requirement unless approved by the department head before travel.

Other courses may qualify for the college and university requirements categories. Students should consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts or in the International Studies Degree Program Office. The list incorporates University Core Curriculum requirements. No course can be counted in more than one category, except as allowed in the International and Cultural Diversity graduation requirement.

See the MIA program in the Graduate and Professional Catalog for the MIA requirements.

### Modern Languages - BA, French Option

The department offers a wide range of courses in Modern Languages at all levels of the undergraduate curriculum as part of its mission to support and advance the international and global competencies of university students. At present, students can earn a BA in Modern Languages with options in French, German or Russian. Courses are designed to offer students extended study of the language, literatures, and cultures of these language communities. The department insists on a high competence in the language, which is the basis for all other options. Students will be required to complete, by coursework or placement test, all 100- and 200-level courses in sequence (except FREN 221/FREN 222, GERM 221/GERM 222 and RUSS 221/RUSS 222, which are taken concurrently) before taking any upper-level course, unless an upper-level course permits co-registration or skipping a lower course in the sequence (see inventory of courses for prerequisites). Once a student has received credit for a higher-level language course, the student is no longer eligible to receive credit for prerequisite courses. In addition to classes at the College Station campus, the department offers summer study abroad programs for credit. Departmental faculty and advising staff also work closely with students to match their interests with semester and full-year programs abroad.

### Program Requirements

#### Required courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREN 201</td>
<td>Intermediate French I</td>
<td>3</td>
</tr>
<tr>
<td>or FREN 221</td>
<td>or Field Studies I</td>
<td>3</td>
</tr>
<tr>
<td>FREN 202</td>
<td>Intermediate French II</td>
<td>3</td>
</tr>
<tr>
<td>or FREN 222</td>
<td>or Field Studies II</td>
<td>3</td>
</tr>
<tr>
<td>FREN 300-FREN 399</td>
<td>(p. 787)</td>
<td>18</td>
</tr>
<tr>
<td>FREN 410</td>
<td>Seminar in French Literature</td>
<td>3</td>
</tr>
<tr>
<td>FREN 418</td>
<td>Seminar in French Civilization</td>
<td>3</td>
</tr>
<tr>
<td>FREN 400-FREN 499</td>
<td>(p. 787)</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Minor Requirement

All majors must select 15-18 hours in a minor field of study \(^1\) 15-18

### College, University Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
<td></td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td></td>
</tr>
<tr>
<td>COMM 205</td>
<td>Communication for Technical Professions</td>
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</tr>
<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
<td></td>
</tr>
<tr>
<td>Literature in English (p. 405)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Mathematics (p. 20) (^2)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Language, philosophy and culture (p. 21)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Creative arts (p. 22)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Life and physical sciences (p. 20)</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Social and behavioral science (p. 23)</td>
<td>6</td>
<td></td>
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<tr>
<td>American history (p. 23)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
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</tbody>
</table>

International and cultural diversity (p. 34) \(^3\)
Program Requirements

Required Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>GERM 201</td>
<td>Intermediate German I</td>
<td>3</td>
</tr>
<tr>
<td>or GERM 221</td>
<td>or Field Studies I</td>
<td></td>
</tr>
<tr>
<td>GERM 202</td>
<td>Intermediate German II</td>
<td>3</td>
</tr>
<tr>
<td>or GERM 222</td>
<td>or Field Studies II</td>
<td></td>
</tr>
<tr>
<td>GERM 310</td>
<td>Composition</td>
<td>3</td>
</tr>
<tr>
<td>GERM 315</td>
<td>Literary Investigations: German Short Fiction</td>
<td>3</td>
</tr>
<tr>
<td>GERM 410</td>
<td>Seminar in German Literature and Culture</td>
<td>3</td>
</tr>
<tr>
<td>(emphasizing inquiry and research skills)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GERM 411</td>
<td>German Author and Genre Studies (emphasizing</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>inquiry and research skills)</td>
<td></td>
</tr>
</tbody>
</table>

GERM 321-GERM 419 (p. 809)  
GERM 300-GERM 499 (p. 809)

Minor Requirement

All majors must select 15-18 hours in a minor field of study

15-18

Study Abroad Requirement

All German majors are required to study abroad

College, University Requirement

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>See the Minor Field of Study paragraph.</td>
<td></td>
</tr>
<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
<td></td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
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<tr>
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</tr>
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<tr>
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<td>American National Government</td>
<td>3</td>
</tr>
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<td>State and Local Government</td>
<td>3</td>
</tr>
<tr>
<td>International and cultural diversity (p. 34)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

General electives 18-21

Total Semester Credit Hours 120

1. GERM 334, GERM 410 and GERM 411 may be repeated for credit with different content.
2. See the Minor Field of Study paragraph.
3. See the Study Abroad Requirement paragraph.
4. At least three hours must be in MATH. Three hours may be PHIL 240.
5. Courses may be used to satisfy other requirements.

Minor Field of Study

All Modern Language majors must select a minor field of study from departments or divisions within or outside of the College of Liberal Arts or in a particular area of interest (as in the case of interdisciplinary minors). The minor will consist of a minimum of 15 hours of coursework,
as defined by the minor department. No more than 9 credit hours may be at the 100-299 level. Interdisciplinary minors such as women's and gender studies, classical studies, religious studies, and business have specific requirements; students should consult undergraduate advisors in these areas of study. A second major may substitute for the minor. Courses used to meet the minor requirements may not be used in the major. See also the statement on "Minor Field of Study" under the general requirements of the College of Liberal Arts. In general, the careful combination of foreign language skills with other major curricula enhances preparation for careers in business, industry and government. Teaching certification is available to majors through the College of Education and Human Development. Consult the College of Education and Human Development section under secondary teacher certification for additional information.

Study Abroad Requirement

All German majors are required to study for one semester or summer in a German-speaking country approved by the department.

Any departmental major must earn a "C" or better in all major and minor coursework.

Other courses may qualify for the college and university requirements categories. Students should consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts. The lists incorporate University Core Curriculum requirements. No course can be counted in more than one category.

Modern Languages - BA, Russian Option

The department offers a wide range of courses in Modern Languages at all levels of the undergraduate curriculum as part of its mission to support and advance the international and global competencies of university students. At present, students can earn a BA in Modern Languages with options in French, German or Russian. Courses are designed to offer students extended study of the language, literatures, and cultures of these language communities. The department insists on a high competence in the language, which is the basis for all other options. Students will be required to complete, by coursework or placement test, all 100- and 200-level courses in sequence (except FREN 221/FREN 222, GERM 221/GERM 222 and RUSS 221/RUSS 222, which are taken concurrently) before taking any upper-level course, unless an upper-level course permits co-registration or skipping a lower course in the sequence (see inventory of courses for prerequisites). Once a student has received credit for a higher-level language course, the student is no longer eligible to receive credit for prerequisite courses. In addition to classes at the College Station campus, the department offers summer study abroad programs for credit. Departmental faculty and advising staff also work closely with students to match their interests with semester and full-year programs abroad.

Program Requirements

**Required courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>RUSS 201</td>
<td>Intermediate Russian I</td>
<td>3</td>
</tr>
<tr>
<td>or RUSS 221</td>
<td>Field Studies I</td>
<td></td>
</tr>
<tr>
<td>RUSS 202</td>
<td>Intermediate Russian II</td>
<td>3</td>
</tr>
<tr>
<td>or RUSS 222</td>
<td>Field Studies II</td>
<td></td>
</tr>
<tr>
<td>RUSS 301</td>
<td>Advanced Grammar and Composition I</td>
<td>3</td>
</tr>
<tr>
<td>RUSS 302</td>
<td>Advanced Grammar and Composition II</td>
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</table>

**Required courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>RUSS 410</td>
<td>Seminar in Russian Studies (emphasizing inquiry and research skills)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Select one of the following:**

- RUSS 441/The Russian Novel I: Tolstoy and Dostoevsky
- RUSS 442/The Russian Novel II: The Twentieth Century
- RUSS 443/Contemporary Russian Prose
- RUSS 444/Russian Drama

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>EURO 446</td>
<td>Russian Artistic Culture I: Beginnings to 1900</td>
<td>3</td>
</tr>
<tr>
<td>or RUSS 447/</td>
<td>or Russian Artistic Culture II: 1890 to Present</td>
<td></td>
</tr>
</tbody>
</table>

Select four from the following:

- RUSS 203-RUSS 220 (p. 964)
- RUSS 223-RUSS 499 (p. 964)
- EURO 440-EURO 449 (p. 777) (up to 6 hours)

**Minor Requirement**

All majors must select 15-18 hours in a minor field of study 15-18

**College, University Requirement**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
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</thead>
<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
</tbody>
</table>

**Select one of the following:**

- ENGL 203 Writing about Literature
- ENGL 210 Technical and Business Writing
- COMM 203 Public Speaking
- COMM 205 Communication for Technical Professions
- COMM 243 Argumentation and Debate

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
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</thead>
<tbody>
<tr>
<td>EURO 440</td>
<td>Literature in English (p. 405)</td>
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</tr>
<tr>
<td>Mathematics (p. 20)</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**General electives**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>18-21</td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours**

120

1 See the Minor Field of Study paragraph.
2 At least three hours must be in MATH. Three hours may be PHIL 240.
3 Courses may be used to satisfy other requirements.

**Minor Field of Study**

All Modern Language majors must select a minor field of study from departments or divisions within or outside of the College of Liberal Arts or in a particular area of interest (as in the case of interdisciplinary minors). The minor will consist of a minimum of 15 hours of coursework, as defined by the minor department. No more than 9 credit hours may be at the 100-299 level. Interdisciplinary minors such as women's and gender studies, classical studies, religious studies, and business have
specific requirements; students should consult undergraduate advisors in these areas of study. A second major may substitute for the minor. Courses used to meet the minor requirements may not be used in the major. See also the statement on “Minor Field of Study” under the general requirements of the College of Liberal Arts. In general, the careful combination of foreign language skills with other major curricula enhances preparation for careers in business, industry and government. Teaching certification is available to majors through the College of Education and Human Development. Consult the College of Education and Human Development section under secondary teacher certification for additional information.

Any departmental major must earn a “C” or better in all major and minor coursework.

Other courses may qualify for the college and university requirements categories. Students should consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts. The lists incorporate University Core Curriculum requirements. No course can be counted in more than one category.

Arabic Studies - Minor

The minor in Arabic Studies is an academic program open to all students in the university. The minor is interdisciplinary in nature and combines courses in Arabic language and culture with electives in Arabic studies, as well as a capstone project. The minor is a valuable complement to the academic portfolio of any student majoring in the humanities, social sciences, or natural sciences, who wishes to add an international dimension to their intellectual profile. In addition, Arabic Studies faculty offer study abroad programs in order to enrich student learning experiences and cultural knowledge while helping students attain higher proficiency in the language.

Students must complete ARAB 101 and ARAB 102 before they may declare a minor in Arabic Studies.

Program Requirements

Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARAB 202</td>
<td>Intermediate Arabic II</td>
<td>3</td>
</tr>
<tr>
<td>ARAB 221</td>
<td>Introduction to Arabic Language and Society</td>
<td>3</td>
</tr>
<tr>
<td>ARAB 301</td>
<td>Reading and Composition</td>
<td>3</td>
</tr>
<tr>
<td>ARAB 302</td>
<td>Reading and Composition II</td>
<td>3</td>
</tr>
<tr>
<td>ARAB 491</td>
<td>Research (Capstone course)</td>
<td>3</td>
</tr>
</tbody>
</table>

Electives

Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG 320</td>
<td>The Middle East</td>
<td>3</td>
</tr>
<tr>
<td>HIST 221</td>
<td>History of Islam</td>
<td></td>
</tr>
<tr>
<td>RELS 221</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIST 347</td>
<td>Rise of Islam, 600-1258</td>
<td></td>
</tr>
<tr>
<td>RELS 347</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIST 348</td>
<td>Modern Middle East</td>
<td></td>
</tr>
<tr>
<td>INTS 484</td>
<td>Directed Internship (in an Arabic-speaking country)</td>
<td></td>
</tr>
<tr>
<td>LBAR 484</td>
<td>Internship</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours  18

Students must earn a “C” or better in all minor coursework.

Capstone Project

A capstone project that is completed in an approved upper-division Arabic Studies course is required of all students pursuing a minor in Arabic Studies during their final year of the program. It consists of a substantial research paper (15–20 pages) on an original topic and is conducted under the direction of a faculty member with the approval of the departmental advisors. Through the capstone course and project, students get a chance to integrate their classroom knowledge about the Arab world and use their study-abroad experiences and internships in an Arabic-speaking country, if any, to address an issue of interest to them. Issues that students can choose to address could be of linguistic, cultural, historical, religious, or political nature, among others. Upon its completion, and in coordination with the departmental advisors, the final project will be presented orally to Arabic classes in order to maximize its benefits.

Asian Studies - Minor

The minor in Asian Studies is an academic program open to all students in the university. The minor is interdisciplinary in nature and includes Asian Studies courses in the humanities and the social sciences, as well as a capstone project. The minor is a valuable complement to the academic portfolio of any student majoring in the humanities, social sciences, or natural sciences, who wishes to add an international dimension to their intellectual profile.

Program Requirements

Asian Studies Humanities Courses

Select two from the following: 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 396</td>
<td>Studies in American Literature</td>
</tr>
<tr>
<td>HIST 349</td>
<td>The Vietnam War/The American War</td>
</tr>
<tr>
<td>ASIA 349</td>
<td></td>
</tr>
<tr>
<td>HIST 350</td>
<td>Asia During World War II</td>
</tr>
<tr>
<td>ASIA 350</td>
<td></td>
</tr>
<tr>
<td>HIST 351</td>
<td>Traditional East Asia</td>
</tr>
<tr>
<td>ASIA 351</td>
<td></td>
</tr>
<tr>
<td>HIST 352</td>
<td>Modern East Asia</td>
</tr>
<tr>
<td>ASIA 352</td>
<td></td>
</tr>
<tr>
<td>HIST 354</td>
<td>Imperial China</td>
</tr>
<tr>
<td>ASIA 354</td>
<td></td>
</tr>
<tr>
<td>HIST 355</td>
<td>Modern China</td>
</tr>
<tr>
<td>ASIA 355</td>
<td></td>
</tr>
<tr>
<td>HIST 356</td>
<td>Twentieth Century Japan</td>
</tr>
<tr>
<td>ASIA 356</td>
<td></td>
</tr>
<tr>
<td>HIST 481</td>
<td>Seminar in History</td>
</tr>
<tr>
<td>HIST 489</td>
<td>Special Topics in...</td>
</tr>
<tr>
<td>RELS 304</td>
<td>Indian and Oriental Religions</td>
</tr>
<tr>
<td>HUMA 304</td>
<td></td>
</tr>
<tr>
<td>RELS 489</td>
<td>Special Topics in...</td>
</tr>
</tbody>
</table>

Asian Studies Social Sciences Courses

Select two from the following: 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM 335</td>
<td>Intercultural Communication</td>
</tr>
<tr>
<td>COMM 458/JOUR</td>
<td>Global Media</td>
</tr>
<tr>
<td>458</td>
<td></td>
</tr>
<tr>
<td>COMM 460</td>
<td>Communication and Contemporary Issues</td>
</tr>
<tr>
<td>COMM 489</td>
<td>Special Topics in...</td>
</tr>
</tbody>
</table>
GEOG 489 Special Topics in...

POLS 365/ Asian Governments and Politics
ASIA 365

SOCI 329/ Pacific Rim Business Behavior
ASIA 329

SOCI 463 Gender in Asia

SOCI 489 Special Topics in...

Asian Studies Capstone 2
Asian Studies Electives 3

Total Semester Credit Hours 18

1 Or as approved by the director of Asian Studies.
2 Course to be determined by the director of Asian Studies.
3 Select one course from those not used in humanities or social sciences or as approved by the director of Asian Studies.

Students must earn a "C" or better in all minor coursework.

Up to six hours of upper division Asian language courses (300 level or higher) may count toward the minor. If six hours of language courses are used for the minor, the required hours in Asian Studies humanities and social sciences courses will be reduced from 12 hours to 9 hours, and the Asian language courses will be credited as electives.

Students must complete a minimum of six hours of Asian Studies courses toward the minor at the 300 or 400 level in residence at Texas A&M University.

Please see the departmental advisors for electives and curricular offerings.

**Chinese - Minor**

The minor in Chinese is an academic program open to all students in the university. The minor is interdisciplinary in nature and combines courses in Chinese language and culture with electives in Chinese studies, as well as a capstone project. The minor is a valuable complement to the academic portfolio of any student majoring in the humanities, social sciences, or natural sciences, who wishes to add an international dimension to their intellectual profile. In addition, Chinese studies faculty offer study abroad programs in order to enrich student learning experiences and cultural knowledge while helping students attain higher proficiency in the language.

**Program Requirements**

**Core Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHIN 201</td>
<td>Intermediate Chinese I</td>
<td>3</td>
</tr>
<tr>
<td>CHIN 202</td>
<td>Intermediate Chinese II</td>
<td>3</td>
</tr>
<tr>
<td>CHIN 301</td>
<td>Reading and Composition</td>
<td>3</td>
</tr>
<tr>
<td>CHIN 302</td>
<td>Reading and Composition II</td>
<td>3</td>
</tr>
<tr>
<td>CHIN 491</td>
<td>Research (Capstone course)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Elective Course**

Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASIA 306</td>
<td>Society and Population of Modern China</td>
<td></td>
</tr>
<tr>
<td>SOCI 306</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIST 354</td>
<td>Imperial China</td>
<td></td>
</tr>
<tr>
<td>ASIA 354</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIST 355</td>
<td>Modern China</td>
<td></td>
</tr>
<tr>
<td>ASIA 355</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**HIST 358/ Chinese Cultural History**

**ASIA 358**

**POLS 306 Contemporary Political Problems and Issues**

**SOCI 306/ Society and Population of Modern China**

**ASIA 306**

**Total Semester Credit Hours** 18

**Classical Studies - Minor**

The Minor in Classical Studies is an academic program open to all students in the university. The minor is interdisciplinary in nature and combines courses in Greek or Latin language with electives in multiple disciplines. The focus on the history, beliefs, and material culture of ancient Greek and Roman civilization helps students to see how fundamental concepts of Western Civilization first arose in Classical Antiquity, and is a valuable complement to the academic portfolio of any student majoring in the humanities, social sciences, or natural sciences.

**Program Requirements**

**Greek Language**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLAS 211</td>
<td>Intermediate Greek</td>
<td>3</td>
</tr>
<tr>
<td>CLAS 310-CLAS 319 (p. 685)</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

**Electives**

Select two of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLAS 220</td>
<td>History of Christianity: Origins to the Reformation</td>
<td></td>
</tr>
<tr>
<td>CLAS 250-CLAS 499 (p. 685)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>ANTH 317/ RELS 317</td>
<td>Introduction to Biblical Archaeology</td>
<td></td>
</tr>
<tr>
<td>ARCH 430</td>
<td>History of Ancient Architecture</td>
<td></td>
</tr>
<tr>
<td>PHIL 410</td>
<td>The Role of Sculpture and Painting in Ancient Architecture</td>
<td></td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours** 18

**Latin Language**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLAS 221</td>
<td>Intermediate Latin I</td>
<td>3</td>
</tr>
<tr>
<td>CLAS 222</td>
<td>Intermediate Latin II</td>
<td>3</td>
</tr>
<tr>
<td>CLAS 320-CLAS 329 (p. 685)</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

**Electives**

Select two of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLAS 220</td>
<td>History of Christianity: Origins to the Reformation</td>
<td></td>
</tr>
<tr>
<td>CLAS 250-CLAS 499 (p. 685)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>ANTH 317/ RELS 317</td>
<td>Introduction to Biblical Archaeology</td>
<td></td>
</tr>
<tr>
<td>ARCH 430</td>
<td>History of Ancient Architecture</td>
<td></td>
</tr>
</tbody>
</table>
ARCH 434 The Role of Sculpture and Painting in Ancient Architecture
PHIL 410 Classical Philosophy

Total Semester Credit Hours 18

At least 9 hours must be at the 300-499 level.

Students must earn a "C" or better in all minor coursework.

French - Minor

The Minor in French is an academic program open to all students in the university. The minor combines courses in French language and culture, and is a valuable complement to the academic portfolio of any student majoring in the humanities, social sciences, or natural sciences, who wishes to add an international dimension to their intellectual profile.

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREN 201</td>
<td>Intermediate French I</td>
<td>3</td>
</tr>
<tr>
<td>or FREN 221</td>
<td>Field Studies I</td>
<td></td>
</tr>
<tr>
<td>FREN 202</td>
<td>Intermediate French II</td>
<td>3</td>
</tr>
<tr>
<td>or FREN 222</td>
<td>Field Studies II</td>
<td></td>
</tr>
<tr>
<td>FREN 300</td>
<td>Composition</td>
<td>3</td>
</tr>
<tr>
<td>Select three from the following:</td>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 18

Students must make a grade of "C" or better in all minor coursework.

German - Minor

The Minor in German is an academic program open to all students in the university. The minor combines courses in German language and culture, and is a valuable complement to the academic portfolio of any student majoring in the humanities, social sciences, or natural sciences, who wishes to add an international dimension to their intellectual profile. In addition, German studies faculty offer study abroad programs in order to enrich student learning experiences and cultural knowledge while helping students attain higher proficiency in the language.

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GERM 201</td>
<td>Intermediate German I</td>
<td>3</td>
</tr>
<tr>
<td>or GERM 221</td>
<td>Field Studies I</td>
<td></td>
</tr>
<tr>
<td>GERM 202</td>
<td>Intermediate German II</td>
<td>3</td>
</tr>
<tr>
<td>or GERM 222</td>
<td>Field Studies II</td>
<td></td>
</tr>
<tr>
<td>GERM 310</td>
<td>Composition</td>
<td>3</td>
</tr>
<tr>
<td>or GERM 315</td>
<td>Literary Investigations: German Short Fiction</td>
<td></td>
</tr>
<tr>
<td>Select three from the following:</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>EURO 237</td>
<td>The German Roaring '20s</td>
<td></td>
</tr>
<tr>
<td>GERM 300-GERM 309 (p. 809)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GERM 311</td>
<td>Conversation</td>
<td></td>
</tr>
<tr>
<td>GERM 316-GERM 499 (p. 809)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 18

Students must make a grade of C or better.

Italian - Minor

The Minor in Italian is an academic program open to all students in the university. The minor combines courses in Italian language and culture, and is a valuable complement to the academic portfolio of any student majoring in the humanities, social sciences, or natural sciences, who wishes to add an international dimension to their intellectual profile. In addition, Italian studies faculty offer study abroad programs in order to enrich student learning experiences and cultural knowledge while helping students attain higher proficiency in the language.

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITAL 201</td>
<td>Intermediate Italian I</td>
<td>3</td>
</tr>
<tr>
<td>ITAL 202</td>
<td>Intermediate Italian II</td>
<td>3</td>
</tr>
<tr>
<td>ITAL 303</td>
<td>Composition and Conversation</td>
<td>3</td>
</tr>
<tr>
<td>Select three of the following:</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>ITAL 300-ITAL 499 (p. 846)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 18

Students must make a grade of "C" or better in all minor coursework.

Japanese - Minor

The Minor in Japanese is an academic program open to all students in the university. The minor is interdisciplinary in nature and combines courses in Japanese language and culture with electives in Japanese studies, as well as a capstone project. The minor is a valuable complement to the academic portfolio of any student majoring in the humanities, social sciences, or natural sciences, who wishes to add an international dimension to their intellectual profile. In addition, Japanese studies faculty offer study abroad programs in order to enrich student learning experiences and cultural knowledge while helping students attain higher proficiency in the language.

Students must complete JAPN 101 and JAPN 102 before they may declare a minor in Japanese.

Program Requirements

Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAPN 201</td>
<td>Intermediate Japanese I</td>
<td>4</td>
</tr>
<tr>
<td>JAPN 202</td>
<td>Intermediate Japanese II</td>
<td>4</td>
</tr>
<tr>
<td>JAPN 301</td>
<td>Upper Level Japanese I</td>
<td>3</td>
</tr>
<tr>
<td>JAPN 302</td>
<td>Upper Level Japanese II</td>
<td>3</td>
</tr>
<tr>
<td>JAPN 491</td>
<td>Research</td>
<td>1</td>
</tr>
</tbody>
</table>

Elective Course

Select one of the following: 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FILM 481</td>
<td>Seminar in Film Studies</td>
<td></td>
</tr>
<tr>
<td>HIST 350/</td>
<td>Asia During World War II</td>
<td></td>
</tr>
<tr>
<td>ASIA 350</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIST 351/</td>
<td>Traditional East Asia</td>
<td></td>
</tr>
<tr>
<td>ASIA 351</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIST 352/</td>
<td>Modern East Asia</td>
<td></td>
</tr>
<tr>
<td>ASIA 352</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIST 356/</td>
<td>Twentieth Century Japan</td>
<td></td>
</tr>
<tr>
<td>ASIA 356</td>
<td></td>
<td></td>
</tr>
<tr>
<td>JAPN 401</td>
<td>Advanced Japanese I</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 18
Department of Performance Studies

The Department of Performance Studies offers a BA degree in Music, a BA degree in Theatre Arts, minors in both disciplines, and an MA in Performance Studies. A significant number of courses listed in the University Core Curriculum requirements are available through the Department of Performance Studies.

The Bachelor of Arts in Music offers an interdisciplinary approach to the study of music with courses in composition, ethnomusicology, music history, music theory, music technology and performance, as well as classes relating to other disciplines including anthropology, journalism, philosophy, physics, theatre arts and visual arts. Coursework explores a wide range of musics—Western and non-Western; past and present; transmitted by oral, written, and electronic means.

The Bachelor of Arts in Theatre Arts provides a broad-based, liberal arts education. In addition to the University and College of Liberal Arts core courses, theatre students receive specialized courses in theatre and participate in an integrated theatre production program. The curriculum prepares students for theatre training programs, graduate work in the liberal and fine arts, teaching theatre in secondary schools, and a variety of careers in and beyond the arts.

Majors

• Bachelor of Arts in Music (p. 475)
• Bachelor of Arts in Theatre Arts (p. 476)

Minors

• Music Minor (p. 478)
• Performance Technology Minor (p. 478)
• Theatre Arts Minor (p. 478)

Music - BA

Students with an interest in music can declare a music major. The Bachelor of Arts in Music offers courses in music technology, music theory and composition, and musicology as well as a range of performance opportunities. Continuation in the program is based upon successful evaluation of the student’s progress toward degree and proficiency demonstrated by performance or portfolio. The evaluation is normally completed prior to the student’s second year in the program.

Coursework begins with a foundation of Performance, Music Theory, Music History, World Music, and Music Technology. Students develop specializations through upper division electives, and their experience culminates in a capstone project that integrates their studies to help them pursue their next career goals (MUSC 400).

Program Requirements

Performance

Select four hours from the following.  

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSC 253</td>
<td>Individual Performance: Guitar I</td>
</tr>
<tr>
<td>MUSC 254</td>
<td>Individual Performance—Voice I</td>
</tr>
<tr>
<td>MUSC 255</td>
<td>Individual Performance—Keyboard I</td>
</tr>
<tr>
<td>MUSC 256</td>
<td>Individual Performance: String I</td>
</tr>
</tbody>
</table>

Students must earn a “C” or better in all minor coursework.
MUSC 259  Individual Performance via Classroom Instruction  1
MUSC 270  Individual Performance: Woodwind I  1
MUSC 271  Individual Performance: Brass I  1
MUSC 272  Individual Performance: Percussion I  1
MUSC 353  Individual Performance: Guitar II  1
MUSC 354  Individual Performance--Voice II  1
MUSC 355  Individual Performance—Keyboard II  1
MUSC 356  Individual Performance: String II  1
MUSC 370  Individual Performance: Woodwind II  1
MUSC 371  Individual Performance: Brass II  1
MUSC 372  Individual Performance: Percussion II  1

Ensemble Performance
MUSC 280  Ensemble Performance--Symphonic Band
MUSC 281  Ensemble Performance--Small Ensembles
MUSC 286  Ensemble Performance--Symphony Orchestra
MUSC 290  Ensemble Performance--Choir

Composition
MUSC 245  Composition I
& MUSC 345  Composition II
At least one credit must be taken in Individual Performance

Music Theory
MUSC 204  Music Theory I  6
& MUSC 205  and Music Theory II
& MUSC 206  and Music Theory III
Select one of the following:  3
MUSC 208  Musicianship I
& MUSC 210  and Musicianship II
& MUSC 212  and Musicianship III
MUSC 208  Musicianship I
& MUSC 214  and Perspectives on World Music
& MUSC 215  and Fieldwork in World Music
MUSC 207  Form and Analysis  2

Music History, World Music and Music Technology
MUSC 312  Music in Modern Western Culture  3
MUSC 316  Music and Technology  3
MUSC 324/ ANTH 324  Music in World Cultures  3

Specialization
Select nine hours from the following:  9
MUSC 200  Topics in Music  2
Music electives (300- to 400-level) (p. 895)
Select two of the following:  6
ANTH 201  Introduction to Anthropology
ARTS 350  The Arts and Civilization
PERF 301  Performance in World Cultures
PERF 326  Dance and Identity in the United States
PHIL 330  Philosophy of Art
THAR 302  Dramaturgy
THAR 308  Stage Management and Arts Administration

MUSC 400  Senior Seminar and Project  3

College and University Requirements
Communication (p. 405)  6
Language in English (p. 405)  6
Foreign language (p. 405)  14
Mathematics (p. 20)  6
Life and physical sciences (p. 20)  9
Language, philosophy and culture or Creative arts (p. 21)  9
Social and behavioral science (p. 23)  6
American history (p. 23)  6
POLS 206  American National Government  3
POLS 207  State and Local Government  3
International and cultural diversity (p. 34)  3
Free electives  10
MUSC 345  Composition II  1

Total Semester Credit Hours  136

1 At least two of the four semester credit hours will be in Individual Performance. A student may substitute two Composition credits for one Individual Performance credit and one Ensemble Performance credit.
2 Maximum of 3 semester credit hours.
3 May be used to satisfy other requirement.
4 Exceptions are STLC 001-STLC 499 (p. 993).

A grade of C or higher is required for a course to be counted in the major field. A student must complete 18 hours of music coursework at Texas A&M University.

Theatre Arts - BA

The Bachelor of Arts in Theatre Arts provides a humanities-oriented approach to the study of theatre as a cultural practice. By means of classroom instruction and an integrated production component, the Theatre Arts student gains both a fundamental academic background and the foundations for training as a theatre artist. This preparation can lead to a career in commercial theatre or educational theatre, advanced study in a variety of related professional disciplines, or entry into a broad array of careers in public relations and communications. The program’s holistic approach to the art of theatre provides a foundation from which students can develop a variety of career paths.

Production Requirements for Theatre Arts Majors

Performance and production are integral to the Theatre Arts major. The production component is designed to encourage, guide and challenge individual creative and artistic development. Theatre Arts majors are expected to actively participate in departmental productions in the areas of performance, design, crew and/or production.

Program Requirements

THAR 102  Script Analysis  3
THAR 110  Acting I: Fundamentals  3
THAR 135  Theatre Technology I  3
THAR 245  Basic Theatrical Design  3
### Theatre Arts Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>THAR 381</td>
<td>Theatre History and Dramatic Literature I</td>
<td>3</td>
</tr>
<tr>
<td>THAR 382</td>
<td>Theatre History and Dramatic Literature II</td>
<td>3</td>
</tr>
<tr>
<td>THAR 420</td>
<td>Directing</td>
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<tr>
<td></td>
<td>Select one of the following:</td>
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<tr>
<td></td>
<td>THAR 290 Theatre Practicum: Crew</td>
<td>3</td>
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<tr>
<td></td>
<td>THAR 390 Theatre Practicum: Performance</td>
<td>3</td>
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<tr>
<td></td>
<td>THAR 391 Theatre Practicum: Production</td>
<td>3</td>
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<tr>
<td></td>
<td>THAR 392 Theatre Practicum: Design</td>
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<td></td>
<td>Select three courses from one of the following concentrations:</td>
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<tr>
<td></td>
<td><strong>Acting/Directing Concentration</strong></td>
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<tr>
<td></td>
<td>THAR 115 Voice and Articulation</td>
<td>3</td>
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<td></td>
<td>THAR 210 Acting II: Characterization</td>
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<td>THAR 310 Acting III: Period Styles</td>
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<td>THAR 407 Performing Literature.</td>
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<td>THAR 410 Acting IV - Advanced Problems in Acting</td>
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<td></td>
<td>Other special THAR course offerings approved by department head or department head's designee (p. 996)</td>
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<tr>
<td></td>
<td><strong>Design/Technical Theatre Concentration</strong></td>
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<td>THAR 250 Stage Makeup</td>
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<td>THAR 255 Costume Technology I</td>
<td>3</td>
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<td></td>
<td>THAR 308 Stage Management and Arts Administration</td>
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<td></td>
<td>THAR 335 Theatre Technology II</td>
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<td></td>
<td>THAR 345 Scene Design</td>
<td>3</td>
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<td>THAR 355 Costume Design</td>
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<td>THAR 360 Lighting Design</td>
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<td>THAR 435 New Technology for Designers</td>
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<td>THAR 445 Design as Performance</td>
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<td></td>
<td>Other special THAR course offerings approved by department head or department head's designee (p. 996)</td>
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<tr>
<td></td>
<td><strong>Theatre and Culture Concentration</strong></td>
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<td></td>
<td>THAR 155 History of Western Dress</td>
<td>3</td>
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<td></td>
<td>THAR 156 Dress, Culture and Society</td>
<td>3</td>
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<td></td>
<td>THAR 201 Introduction to World Theatre</td>
<td>3</td>
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<td></td>
<td>THAR 282 American Theatre</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>THAR 302 Dramaturgy</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>THAR 328/ MUSC 328 Japanese Traditional Performing Arts</td>
<td>3</td>
</tr>
<tr>
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<td>THAR 386/ MUSC 386 Evolution of the American Musical</td>
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<td>THAR 407 Performing Literature.</td>
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<td>THAR 482 Topics in American Theatre and Performance</td>
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<td></td>
<td>ENGL 385 Playwriting</td>
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<tr>
<td></td>
<td>PERF 301 Performance in World Cultures</td>
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<tr>
<td></td>
<td>Other special THAR course offerings approved by department head or department head's designee (p. 996)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>College and University Requirements</strong></td>
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<td></td>
<td>ENGL 104 Composition and Rhetoric</td>
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<td>Select one of the following:</td>
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<tr>
<td></td>
<td>ENGL 203 Writing about Literature</td>
<td>3</td>
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<tr>
<td></td>
<td>ENGL 235 Elements of Creative Writing</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ENGL 241 Advanced Composition</td>
<td>3</td>
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<tr>
<td></td>
<td>COMM 203 Public Speaking</td>
<td>3</td>
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<tr>
<td></td>
<td>ENGL 212 Shakespeare</td>
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<tr>
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<td>Select one of the following:</td>
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<tr>
<td></td>
<td>ENGL 317 Early British Drama</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ENGL 340 Modern and Contemporary Drama</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ENGL 412 Studies in Shakespeare</td>
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<td></td>
<td>Foreign language (p. 405)</td>
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<td></td>
<td>Mathematics (p. 20)</td>
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<td></td>
<td>Life and physical sciences (p. 20)</td>
<td>9</td>
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<td></td>
<td>Language, philosophy and culture (p. 21)</td>
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<td></td>
<td>Creative arts (p. 22)</td>
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<td></td>
<td>Language, philosophy, culture and Creative arts</td>
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<tr>
<td></td>
<td>PSYC 107 Introduction to Psychology</td>
<td>3</td>
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<tr>
<td></td>
<td>Social and behavioral science (p. 23)</td>
<td>3</td>
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<tr>
<td></td>
<td>American history (p. 23)</td>
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<td></td>
<td>POLS 206 American National Government</td>
<td>3</td>
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<td>POLS 207 State and Local Government</td>
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<td></td>
<td>International and cultural diversity (p. 34)</td>
<td>2</td>
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<tr>
<td></td>
<td>Free electives</td>
<td>16</td>
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</tbody>
</table>

**Total Semester Credit Hours**: 120

1. Minimum grade of C required.
2. May be used to satisfy other requirement.
3. Exceptions are STLC 100 - STLC 499 (p. 993).

No more than 33 credits in theater arts can be applied to the degree. A minimum of 12 hours must be taken at the upper division (300-400 level). A grade of C or higher is required for a course to be counted in the major field.

No course can be counted in more than one category, except as allowed in the International and Cultural Diversity Graduation requirement.

### Teacher Certification in Theatre Arts

#### Theatre Arts Majors

Theatre arts majors desiring certification to teach theatre arts (drama) in the secondary schools of Texas also must take a minimum of 24 semester hours in a second teaching field.

#### Non-Theatre Arts Majors

Students not majoring in theatre arts and desiring certification to teach theatre arts in the secondary schools of Texas must take the following theatre arts courses:

- THAR 102 Script Analysis 3
- THAR 110 Acting I: Fundamentals 3
- THAR 135 Theatre Technology I 3
- THAR 381 Theatre History and Dramatic Literature I 3
- THAR 382 Theatre History and Dramatic Literature II 3
- THAR 420 Directing 3
- THAR 345 Scene Design 3
- or THAR 355 Costume Design
- or THAR 360 Lighting Design
Music - Minor

Students from diverse musical backgrounds and interests are encouraged to become involved in the study and practice of the musical arts at Texas A&M, as a complement to their major fields of study. Introductory and advanced courses emphasize the interrelationships among music history, theory, ethnomusicology, composition, technology, performance and other creative arts. Attendance at the numerous concerts and lectures presented each year and participation in the performing ensembles are encouraged to broaden the classroom experience. Students desiring to undertake the structured approach to the study of music may wish to consider the Music Minor Program.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUSC 200</td>
<td>Topics in Music</td>
<td>3</td>
</tr>
<tr>
<td>or MUSC 201</td>
<td>Music and the Human Experience</td>
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<tr>
<td>MUSC 204</td>
<td>Music Theory I</td>
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<tr>
<td>MUSC 208</td>
<td>Musicianship I</td>
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Select 2-3 hours from the following: 2-3

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>MUSC 245</td>
<td>Composition I</td>
<td></td>
</tr>
<tr>
<td>MUSC 253</td>
<td>Individual Performance: Guitar I</td>
<td></td>
</tr>
<tr>
<td>MUSC 254</td>
<td>Individual Performance--Voice I</td>
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</tr>
<tr>
<td>MUSC 255</td>
<td>Individual Performance--Keyboard I</td>
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</tr>
<tr>
<td>MUSC 256</td>
<td>Individual Performance: String I</td>
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</tr>
<tr>
<td>MUSC 259</td>
<td>Individual Performance via Classroom Instruction</td>
<td></td>
</tr>
<tr>
<td>MUSC 270</td>
<td>Individual Performance: Woodwind I</td>
<td></td>
</tr>
<tr>
<td>MUSC 271</td>
<td>Individual Performance: Brass I</td>
<td></td>
</tr>
<tr>
<td>MUSC 272</td>
<td>Individual Performance: Percussion I</td>
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</tr>
<tr>
<td>MUSC 280</td>
<td>Ensemble Performance--Symphonic Band</td>
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<tr>
<td>MUSC 281</td>
<td>Ensemble Performance--Small Ensembles</td>
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<td>MUSC 282</td>
<td>Ensemble Performance--Jazz Ensemble</td>
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<tr>
<td>MUSC 283</td>
<td>University Student Orchestra</td>
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<tr>
<td>MUSC 286</td>
<td>Ensemble Performance--Symphony Orchestra</td>
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<td>MUSC 290</td>
<td>Ensemble Performance--Choir</td>
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<tr>
<td>MUSC 345</td>
<td>Composition II</td>
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<tr>
<td>MUSC 353</td>
<td>Individual Performance: Guitar II</td>
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<tr>
<td>MUSC 354</td>
<td>Individual Performance--Voice II</td>
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</tr>
<tr>
<td>MUSC 355</td>
<td>Individual Performance--Keyboard II</td>
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</tr>
<tr>
<td>MUSC 356</td>
<td>Individual Performance: String II</td>
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<tr>
<td>MUSC 370</td>
<td>Individual Performance: Woodwind II</td>
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<tr>
<td>MUSC 371</td>
<td>Individual Performance: Brass II</td>
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<tr>
<td>MUSC 372</td>
<td>Individual Performance: Percussion II</td>
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<tr>
<td>MUSC 316</td>
<td>Music and Technology</td>
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</table>

Select three of the following: 9

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>ANTH 324</td>
<td>Music in World Cultures</td>
<td></td>
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<tr>
<td>MUSC 324</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MUSC 300</td>
<td>MUSC 499</td>
<td></td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours** 27

1 To be chosen in consultation with a theatre arts academic advisor.

Performance Technology - Minor

The Minor in Performance Technology is open to all majors. It gives students research experiences through interdisciplinary technology-based performances.

**Program Requirements**

Required courses in the minor include an introductory survey of essential concepts and skills (PERF 202) and a capstone course in Intermedia Performance based on interdisciplinary collaboration (PERF 402). Additional courses in the minor are drawn from the Music, Performance Studies, or Theatre Arts curricula focusing on advanced applications and analysis of technology in performance including consideration of aural, visual, and human components; sensors and actuators; data and programming; construction; and composition, design, improvisation, and devised performance. Students are encouraged to propose or apply for unique performance and research experiences (PERF 483 and PERF 491) in order to build their portfolios and better align their coursework with their professional goals.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>PERF 202</td>
<td>Introduction to Performance Technology</td>
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<tr>
<td>PERF 402</td>
<td>Intermedia Performance</td>
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Select four of the following: 12

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<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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</thead>
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<tr>
<td>MUSC 316</td>
<td>Music and Technology</td>
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<tr>
<td>MUSC 317</td>
<td>Recording and the Producer</td>
<td></td>
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<tr>
<td>MUSC 491</td>
<td>Research</td>
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<tr>
<td>PERF 318</td>
<td>Electronic Composition</td>
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<tr>
<td>MUSC 318</td>
<td></td>
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<tr>
<td>PERF 483</td>
<td>Performance Practicum</td>
<td></td>
</tr>
<tr>
<td>PERF 491</td>
<td>Research</td>
<td></td>
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<td>THAR 435</td>
<td>New Technology for Designers</td>
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<td>THAR 445</td>
<td>Design as Performance</td>
<td></td>
</tr>
<tr>
<td>THAR 491</td>
<td>Research</td>
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</tbody>
</table>

**Total Semester Credit Hours** 18

A minimum of six semester credit hours must be at the 300-400 level.

Students must make a grade of "C" or better in all courses.

The capstone course, PERF 402, allows students to integrate and apply knowledge and skills pertaining to technology-based performance in interdisciplinary collaborative projects.

Theatre Arts - Minor

Students are encouraged to become involved in the Theatre Arts Program as a complement to their major fields. The Theatre Arts Program in the Department of Performance Studies offers instruction to students who want to study theatre as a liberal art. Introductory and advanced courses emphasize interrelationships among performance, design, theatre history, and analysis of dramatic texts. Attendance at, and participation
Program Requirements

THAR 102 Script Analysis 3
Select one of the following: 3
THAR 110 Acting I: Fundamentals
THAR 135 Theatre Technology I
THAR 245 Basic Theatrical Design
THAR 381 Theatre History and Dramatic Literature I 3
THAR 382 Theatre History and Dramatic Literature II 3
Theater electives
Select two from the following: 6
Acting/Directing
THAR 110 Acting I: Fundamentals 1
THAR 115 Voice and Articulation
THAR 210 Acting II: Characterization
THAR 310 Acting III: Period Styles
THAR 407 Performing Literature.
THAR 410 Acting IV - Advanced Problems in Acting
THAR 420 Directing
Design/Technical Theater
THAR 135 Theatre Technology I 1
THAR 245 Basic Theatrical Design 1
THAR 250 Stage Makeup
THAR 255 Costume Technology I
THAR 308 Stage Management and Arts Administration
THAR 335 Theatre Technology II
THAR 345 Scene Design
THAR 355 Costume Design
THAR 360 Lighting Design
THAR 435 New Technology for Designers
THAR 445 Design as Performance
Theater and Culture
ENGL 385 Playwriting
PERF 301 Performance in World Cultures
THAR 155 History of Western Dress
THAR 156 Dress, Culture and Society
THAR 201 Introduction to World Theatre
THAR 282 American Theatre
THAR 302 Dramaturgy
THAR 328/ MUSC 328 Japanese Traditional Performing Arts
THAR 386/ MUSC 386 Evolution of the American Musical
THAR 407 Performing Literature.
THAR 482 Topics in American Theatre and Performance
Or other special THAR course offerings as approved by the department head or designee (p. 996)

Total Semester Credit Hours 18

1 If not used for the Acting, Theater Technology or Design requirements.

Students must make a grade of "C" or better in all courses.

Department of Philosophy and Humanities

The Greek philosopher Socrates once said that the unexamined life is not worth living. For more than 2,000 years, philosophy has been the source of the most intensely reflective, influential and argued versions of that examination. The concerns of philosophy range from the arts, the methods and foundations of the sciences, politics, education, and religion to the complex questions relating to the meaning of reality, truth, values and the significance of human history. The study of philosophy is an essential dimension of a well-educated person.

Philosophy seeks to establish standards of evidence, provide rational methods of resolving conflicts, and create techniques for evaluating ideas and arguments. Philosophy develops the capacity to see the world from the perspectives of other individuals and other cultures; it enhances one's ability to perceive the relationships among the various fields of study; and it deepens one's sense of the meaning and variety of human experience.

Toward these ends the program in philosophy at Texas A&M is structured to provide students with the skills necessary to appreciate more fully the central concerns of human existence and develop abilities in problem-solving, communication, persuasion, writing, and critical thinking.

Students, along with parents and friends, often assume that the only undergraduates who major in philosophy are those who intend to pursue graduate degrees in philosophy, theology and law. The breadth of skills developed, however, makes the study of philosophy appropriate for students entering professional fields such as medicine, business and education, and for those preparing for graduate work in the humanities or the social sciences.

It should be stressed that the non-academic value of a field of study must not be viewed mainly in terms of its contribution to obtaining one's first job after graduation. Students are understandably preoccupied with getting their first job, but even from a narrow vocational point of view it would be short-sighted to concentrate on that at the expense of developing potential for success and advancement once hired. Factors leading to initial employment are not necessarily those that lead to promotions or beyond a first position. This is so because the needs of many employers alter with changes in social and economic patterns. It is therefore crucial to see beyond the specifics of a job description.

As this suggests, there are people trained in philosophy in just about every field. They have gone into not only such professions as teaching, medicine, and law, but also into computer science, management, publishing, sales, government service, criminal justice, public relations, and other fields.

Majors

• Bachelor of Arts in Philosophy (p. 479)

Philosophy - BA

The program in philosophy at Texas A&M is structured to provide students with the skills necessary to appreciate more fully the central
concerns of humans existence and develop abilities in problem-solving, communication, persuasion, writing and critical thinking.

**Program Requirements**

PHIL 240 Introduction to Logic 1 3
or PHIL 341 or Symbolic Logic
or PHIL 342 or Symbolic Logic II
PHIL 305 Philosophy of the Natural Sciences 3
or PHIL 307 or Philosophy of the Social Sciences
or PHIL 351 or Theory of Knowledge
PHIL 320 Philosophy of Mind 3
or PHIL 331/RELS 331 or Philosophy of Religion
or PHIL 361 or Metaphysics
PHIL 330 Philosophy of Art 3
or PHIL 332 or Social and Political Philosophy
or PHIL 381 or Ethical Theory
PHIL 410 Classical Philosophy 3
PHIL 412 Seventeenth-Century Philosophy 3
or PHIL 413 or Eighteenth-Century Philosophy
Select one of the following: 3
PHIL 414 Nineteenth Century Philosophy
PHIL 417 Phenomenology
PHIL 418 Existentialism
PHIL 419 Current Continental Philosophy
PHIL 415 American Philosophy 3
or PHIL 416 or Recent British and American Philosophy
or PHIL 424 or Philosophy of Language
Philosophy electives (any PHIL course including above) (p. 928) 6

**College and University Requirements**

ENGL 104 Composition and Rhetoric 3
Select one of the following: 3
ENGL 203 Writing about Literature
ENGL 210 Technical and Business Writing
COMM 203 Public Speaking
COMM 205 Communication for Technical Professions
COMM 243 Argumentation and Debate

Literature in English (p. 405) 6
Foreign language (p. 405) 14
Mathematics (p. 20) 2
Life and Physical Sciences (p. 20) 3
Language, philosophy and culture (p. 21) 6
Creative arts (p. 22) 3
Social and behavioral sciences (p. 23) 6
POLS 206 American National Government 3
POLS 207 State and Local Government 3
American history (p. 23) 4
International and cultural diversity (p. 34) 6
Electives 5

**Total Semester Credit Hours** 120

1 All majors must take at least one logic course. If a logic course is used to fulfill part of the University requirement in logical/mathematical reasoning, one additional philosophy course must be taken to fulfill the departmental requirement of 30 credits.

2 At least 3 hours must be in MATH. Three hours may be PHIL 240.

3 Two or more courses, minimum of one course shall include a corresponding laboratory. The other course must come from these courses or others approved for the University Core Curriculum. One course must include a corresponding laboratory.

4 Courses only in U.S. History.

5 Minors hours are included; however, philosophy courses may not be used as elective hours.

30 credits minimum; no more than 33 credits in philosophy can be applied to the degree. Students choose at least one course from each category in philosophy. A grade of C or higher is required for a course to be counted in the major field.

**Philosophy - Minor**

The Department of Philosophy and Humanities offers a minor in Philosophy.

**Program Requirements**

PHIL 300 - PHIL 499 (p. 928) 3-15
PHIL 100 - PHIL 299 (p. 928) 1

**Total Semester Credit Hours** 15

1 Up to six semester credit hours may be selected from PHIL 100 - PHIL 299 (p. 928).

Students must make a grade of "C" or better in all courses.

**Department of Political Science**

Political science is a social science that investigates collective decision-making. It is concerned with governments, individuals’ attitudes and choices, and the interactions between governing institutions and mass behavior. Among other things, political science addresses power, authority, influence, identity, ethics, law, liberty, justice, wealth, and violence.

The study of political science introduces students to a powerful set of analytical tools for understanding interactions within and among groups of people. These include systematic knowledge of recurring patterns and problems in political life and methods for collecting and analyzing data and other forms of evidence. Studying political science also cultivates critical thinking and effective communication and prepares students for active citizenship, professional success, and lifelong learning.

**Undergraduate Courses**

The Department of Political Science offers courses in all facets of the discipline: American Politics, International Relations, Comparative Politics, Political Theory, Political Methodology, Public Administration and Policy, and Race and Ethnic Politics.

**American Politics**

American politics involves the study of the institutions of national government, law, mass political behavior, elections, political
communication and media, interest groups, political parties, state and local governments, urban politics, and identity in politics in the United States.

**International Relations**

International relations involve the study of relations between the governments of the world. Courses are offered in world politics, American foreign relations, and national security policy.

**Comparative Politics**

This area of political science allows students to develop an in-depth understanding of foreign governments and politics. Courses are offered in European governments, Latin American governments, Asian governments, Russia and the former Soviet states, and in the politics of inequality and globalization.

**Political Theory**

The study of political theory provides students with an understanding of the fundamental relationships between governments and people. Courses range from the study of Greek antiquity to contemporary political ideologies.

**Public Administration and Policy**

This area of political science encompasses the study of public administration and the role of public policy in American politics. Study in this area will provide the student with the opportunity to understand the fundamentals of administration within a political environment. Courses are offered in bureaucracy and administration, state and local finance, urban administration, and government and the economy.

**Political Methodology**

These courses introduce students to scientific research design, statistical analysis, and game theory.

**Race and Ethnic Politics**

These courses provide the student with an in-depth understanding of the role of diversity in politics.

**5-Year Degree Programs**

The Political Science Department also offers joint degree programs in conjunction with the Bush School of Government and Public Service. These enable students to receive either a B.A. or B.S. in political science and a Master of Public Service and Administration (MPSA) degree in five years.

**Honors Program**

The Department of Political Science participates actively in the University honors program. Honors courses are available in all areas of political science. In addition, students may graduate with honors distinction in political science. Honor students also are offered individual instruction under POLS 497. Students interested in the Department’s Honors Program should contact the Political Science Undergraduate Programs Office.

**Teacher Certification**

Students desiring certification to teach civics or government in secondary schools in Texas must meet special additional requirements.

More complete information on requirements for teacher certification may be found in the College of Education and Human Development section under secondary certification.

**Faculty**

Baer, Judith A, Professor
Political Science
PhD, University of Chicago, 1974

Bond, Jon R, Professor
Political Science
PhD, University of Illinois at Urbana-Champaign, 1978

Bragg, Belinda L, Lecturer
Political Science
PhD, Texas A&M University, 2006

Clark, William, Professor
Political Science
PhD, Rutgers University, 1994

Cook, Scott J, Assistant Professor
Political Science
PhD, University of Pittsburgh, 2014

Dixon, Warren A, Senior Assistant Professor
Political Science
PhD, University of Oregon, 1971

Edwards, George C, Distinguished Professor
Political Science
PhD, University of Wisconsin-Madison, 1973

Escobar-Lemmon, Maria, Associate Professor
Political Science
PhD, University of Arizona, 2000

Frazer, Elizabeth J, Executive Professor
Political Science
PhD, Stanford University, 1994

Fuhrmann, Matthew C, Associate Professor
Political Science
PhD, University of Georgia, 2008

Fulton, Sarah A, Associate Professor
Political Science
PhD, University of California, Davis, 2006

Geva, Nehemia, Associate Professor
Political Science
PhD, Ohio State University, 1977

Harmel, Robert, Professor
Political Science
PhD, Northwestern University, 1977

Hill, Kim Q, Professor
Political Science
PhD, Rice University, 1974

Hurley, Patricia A, Professor
Political Science
PhD, Rice University, 1976
Jo, Hyeran, Assistant Professor
Political Science
PhD, University of Michigan, 2008

Johnson, Charles A, Professor
Political Science
PhD, University of Kentucky, 1977

Kellstedt, Paul M, Professor
Political Science
PhD, University of Minnesota, 1996

Koch, Michael T, Associate Professor
Political Science
PhD, University of California, Davis, 2002

Lewis, Dominique H, Lecturer
Political Science
MA, Michigan State University, 2012

Li, Quan, Professor
Political Science
PhD, Florida State University, 1998

Lim, Phaik S, Senior Lecturer
Political Science
PhD, University of Houston, 2003

Lipsmeyer, Christine S, Associate Professor
Political Science
PhD, Vanderbilt University, 1999

McLean, Elena V, Assistant Professor
Political Science
PhD, University of Rochester, 2007

Meier, Kenneth J, Distinguished Professor
Political Science
PhD, Syracuse University, 1975

Nederman, Cary J, Professor
Political Science
PhD, York University, 1983

Pacek, Alexander C, Professor
Political Science
PhD, University of Illinois at Urbana-Champaign, 1991

Palmer, Erica O, Assistant Professor
Political Science
PhD, University of Minnesota, 2010

Pedraza, Francisco, Assistant Professor
Political Science
PhD, University of Washington, 2010

Rice, Mitchell F, Professor
Political Science
PhD, Claremont Graduate School, 1976

Robertson, John D, Professor
Political Science
PhD, University of Illinois at Urbana-Champaign, 1979

Roblyer, Dwight A, Lecturer
Political Science
PhD, Texas A&M University, 2009

Smith, Jason M, Instructional Assistant Professor
Political Science
PhD, Texas A&M University, 2009

Tarar, Ahmer S, Associate Professor
Political Science
PhD, University of Rochester, 2003

Taylor, Michelle M, Professor
Political Science
PhD, Rice University, 1990

Teodoro, Manuel P, Associate Professor
Political Science
PhD, University of Michigan, 2007

Tucker, Harvey J, Professor
Political Science
PhD, University of Michigan, 1977

Ura, Joseph D, Associate Professor
Political Science
PhD, Indiana University, 1977

Von Vacano, Diego A, Associate Professor
Political Science
PhD, University of North Carolina at Chapel Hill, 2006

Whitten, Guy D, Professor
Political Science
PhD, Princeton University, 2003

Wood, Billy D, Professor
Political Science
PhD, University of Houston, 1987

Majors
• Bachelor of Arts in Political Science (p. 483)
• Bachelor of Science in Political Science (p. 483)

5-Year Degree Programs
• Bachelor of Arts in Political Science and Master of Public Service and Administration (p. 484)
• Bachelor of Science in Political Science and Master of Public Service and Administration (p. 484)

Certificates
• Advanced Research Methods in Political Sciences Certificate (p. 485)
• Comparative Study of National Politics Certificate (p. 485)
• European Union Politics Certificate (p. 486)
• Foundations of Political Theory Certificate (p. 487)
• International Relations Certificate (p. 488)
• Law, Politics, and Society Certificate (p. 488)
• Race, Ethnicity, and Gender Politics Certificate (p. 489)
Political Science - BA

The Department of Political Science offers a Bachelor of Arts in Political Science. The B.A. degree program offers a strong liberal arts curriculum aimed at enhancing students’ understanding of politics along with essential training in social science research methods, developing habits of critical thinking, and enhancing students’ written, verbal, and visual communications skills.

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
</tr>
<tr>
<td>POLS 209</td>
<td>Introduction to Political Science Research</td>
<td>3</td>
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<tr>
<td>Political Science electives (p. 940)</td>
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College and University Requirements

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<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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Select one of the following:

- ENGL 203 Writing about Literature
- ENGL 210 Technical and Business Writing
- COMM 203 Public Speaking
- COMM 205 Communication for Technical Professions
- COMM 243 Argumentation and Debate

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<tr>
<th>Course</th>
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<td>Foreign language (p. 405)</td>
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<td>Mathematics (p. 20)</td>
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<td>6</td>
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<tr>
<td>Language, philosophy and culture (p. 21)</td>
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<td>Creative arts (p. 22)</td>
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<tr>
<td>Literature, philosophy, and culture or creative arts (p. 21)</td>
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<td>3</td>
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<tr>
<td>Life and physical sciences (p. 20)</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>Social and behavioral sciences (p. 23)</td>
<td></td>
<td>6</td>
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<tr>
<td>American history (p. 23)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>International and Cultural Diversity (p. 34)</td>
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<tr>
<td>Free electives</td>
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</tbody>
</table>

Total Semester Credit Hours: 120

1. Students must complete this course before taking more than six hours of 300- or 400-level courses in Political Science.
2. At least 3 hours must be in MATH except MATH 102, MATH 150, MATH 167, MATH 365, and MATH 366. Three hours may be PHIL 240.
3. Course must deal with fundamental principles and include a critical evaluation and analysis of data and processes.
4. POLS 100-POLS 499 (p. 940) cannot be used to fulfill this requirement.
5. Course may be used to satisfy any other requirement.

No more than 33 credits in political science may be applied to the degree.

A grade of C or better is required for a course to be counted in the major field.

Other courses may qualify for the college and university requirements. Student should consult the approved list of courses in the Undergraduate Student Services Office in the College of Liberal Arts. No course can be counted in more than one category.

Political Science - BS

The Department of Political Science offers a Bachelor of Science in Political Science. The B.S. program emphasizes building skills in social science research and data analysis while gaining a better understanding of politics, developing habits of critical thinking, and enhancing students’ written, verbal, and visual communications skills.

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
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</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
</tr>
<tr>
<td>POLS 209</td>
<td>Introduction to Political Science Research</td>
<td>3</td>
</tr>
<tr>
<td>Political science electives (p. 940)</td>
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<td>24</td>
</tr>
<tr>
<td>POLS 309</td>
<td>Polimetrics</td>
<td>3</td>
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<tr>
<td>Foreign language (p. 407)</td>
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<td>8</td>
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</table>

Select one of the following:

- POLS 308 Game Theoretic Methods in Political Science
- STAT 307 Sample Survey Techniques
- ECON 449 Economics of Decision-Making Strategy
- ECON 459 Games and Economic Behavior
- CSCE 110 Programming I
- CSCE 111 Introduction to Computer Science Concepts and Programming
- CSCE 206 Structured Programming in C

College and University Requirements

<table>
<thead>
<tr>
<th>Course</th>
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<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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</table>

Select one of the following:

- ENGL 203 Writing about Literature
- ENGL 210 Technical and Business Writing
- COMM 203 Public Speaking
- COMM 205 Communication for Technical Professions
- COMM 243 Argumentation and Debate

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<tr>
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<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Literature in English (p. 405)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Mathematics</td>
<td></td>
<td>9</td>
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</table>

Select one of the following options:

- Option 1:
  - PHIL 240 Introduction to Logic
  - MATH 141 Business Mathematics I
  - MATH 142 Business Mathematics II

- Option 2:
  - MATH 151 Engineering Mathematics I
  - MATH 152 Engineering Mathematics II

- Option 3:
  - MATH 171 Analytic Geometry and Calculus
  - MATH 172 Calculus

- Creative arts (p. 22) |                                    | 3       |
- Language, philosophy and culture (p. 21) |                                      | 3       |
- Language, philosophy and culture or creative arts (p. 21) |                              | 3       |
- Life and physical sciences (p. 20) |                                         | 9       |
- Social and behavioral sciences (p. 23) |                                     | 2       |
American history (p. 23) 6
International and cultural diversity (p. 34) 3
Free electives 2 22
Total Semester Credit Hours 120

1 Students must complete this course before taking more than six hours of 300- or 400-level courses in Political Science.
2 POLS 100-POLS 499 (p. 940) cannot fulfill this requirement.
3 Course may be used to satisfy any other requirement.

No more than 33 credits in political science may be applied to the degree.

Other courses may qualify for the college and university requirements. Student should consult the approved list of courses in the Undergraduate Student Services Office in the College of Liberal Arts. No course can be counted in more than one category.

Political Science - 5-Year Bachelor of Arts/Master of Public Service Administration

Students admitted into this program will be enrolled in Bush School graduate courses with an undergraduate classification for the fall of their fourth year and will be re-classified as degree seeking master’s degree students upon completing 120 credit hours, typically in the following semester. These credit hours must include all specific course prerequisites for a baccalaureate degree in Political Science, as well as the courses required by the College of Liberal Arts and by Texas A&M University for an undergraduate degree. Students will be required to complete the same two-year, 48 hour curriculum as other students admitted to the Bush School’s MPSA program.

Program Requirements

POLS 206 American National Government 3
POLS 207 State and Local Government 3
POLS 209 Introduction to Political Science Research 3
Political Science electives (p. 940) 24

College and University Requirements

ENGL 104 Composition and Rhetoric 3
Select one of the following: 3

ENGL 203 Writing about Literature
ENGL 210 Technical and Business Writing
COMM 203 Public Speaking
COMM 205 Communication for Technical Professions
COMM 243 Argumentation and Debate

Literature in English (p. 405) 6
Foreign language (p. 405) 14
Mathematics (p. 20) 2 6
Language, philosophy and culture (p. 21) 3
Creative arts (p. 22) 3
Literature, philosophy, and culture or creative arts (p. 21) 3
Life and physical sciences (p. 20) 3 9
Social and behavioral sciences (p. 23) 4 6
American history (p. 23) 6

International and Cultural Diversity (p. 34) 5
Free electives 4 25
Total Semester Credit Hours 120

1 Students must complete this course before taking more than six hours of 300- or 400-level courses in Political Science.
2 At least 3 hours must be in MATH except MATH 102, MATH 150, MATH 167, MATH 365, and MATH 366. Three hours may be PHIL 240.
3 Course must deal with fundamental principles and include a critical evaluation and analysis of data and processes.
4 POLS 100-POLS 499 (p. 940) cannot be used to fulfill this requirement.
5 Course may be used to satisfy any other requirement.

No more than 33 credits in political science may be applied to the degree.

A grade of C or better is required for a course to be counted in the major field.

Other courses may qualify for the college and university requirements. Student should consult the approved list of courses in the Undergraduate Student Services Office in the College of Liberal Arts. No course can be counted in more than one category.

See the MPSA program in the Graduate and Professional Catalog for MPSA requirements.

Political Science - 5-Year Bachelor of Science/Master of Public Service Administration

Students admitted into this program will be enrolled in Bush School graduate courses with an undergraduate classification for the fall of their fourth year and will be re-classified as degree seeking master’s degree students upon completing 120 credit hours, typically in the following semester. These credit hours must include all specific course prerequisites for a baccalaureate degree in Political Science, as well as the courses required by the College of Liberal Arts and by Texas A&M University for an undergraduate degree. Students will be required to complete the same two-year, 48 hour curriculum as other students admitted to the Bush School’s MPSA program.

Program Requirements

POLS 206 American National Government 3
POLS 207 State and Local Government 3
POLS 209 Introduction to Political Science Research 3
Political science electives (p. 940) 24

Literature in English (p. 405) 6
Foreign language (p. 405) 14
Mathematics (p. 20) 2 6
Language, philosophy and culture (p. 21) 3
Creative arts (p. 22) 3
Literature, philosophy, and culture or creative arts (p. 21) 3
Life and physical sciences (p. 20) 3 9
Social and behavioral sciences (p. 23) 4 6
American history (p. 23) 6

Game Theoretic Methods in Political Science
STAT 307 Sample Survey Techniques
ECON 449 Economics of Decision-Making Strategy
ECON 459 Games and Economic Behavior
CSCE 110 Programming I
Advanced Research Methods in Political Sciences - Certificate

The Certificate in Advanced Research Methods in Political Science is a means of enhancing undergraduate education through a focused program of courses and independent research. Administered by the Department of Political Science, the program is open to all Texas A&M University undergraduate students, regardless of major. This certificate program aims to enhance students’ skills in research design and quantitative data analysis. It provides valuable technical skills that are essential in graduate schools, professional schools, and careers in a research-intensive, data-driven fields.

This fifteen-hour certificate provides students with the opportunity to pursue independent research in political science. In addition to completing the required course offerings and summer research academy, participants will have opportunities to conduct research with faculty members, present their work at scholarly conferences, and meet with visiting scholars. Research may be conducted one-on-one with a faculty sponsor, or the student may join one of several faculty-led research teams. Students are encouraged to begin planning as freshmen to avoid the addition of extra hours to the degree plan. Certificate requirements are specified in a current brochure available in the Department of Political Science’s Undergraduate Programs Office, Allen Building, room 2024.

Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>POLS 309</td>
<td>Polimetrics</td>
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<tr>
<td>POLS 481</td>
<td>Research Seminar</td>
<td>3</td>
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<tr>
<td>POLS 306</td>
<td>Contemporary Political Problems and Issues</td>
<td>3</td>
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<tr>
<td>POLS 491</td>
<td>Research</td>
<td>3</td>
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<tr>
<td>Option 1:</td>
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<tr>
<td>PHIL 240</td>
<td>Introduction to Logic</td>
<td></td>
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<tr>
<td>MATH 141</td>
<td>Business Mathematics I</td>
<td></td>
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<tr>
<td>MATH 142</td>
<td>Business Mathematics II</td>
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<td>Option 2:</td>
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<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
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<tr>
<td>MATH 152</td>
<td>Engineering Mathematics II</td>
<td></td>
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<tr>
<td>Option 3:</td>
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<td></td>
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<tr>
<td>MATH 171</td>
<td>Analytic Geometry and Calculus</td>
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<td>MATH 172</td>
<td>Calculus</td>
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<tr>
<td>Creative arts (p. 22)</td>
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<td>Language, philosophy and culture or creative arts (p. 21)</td>
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<td>3</td>
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<tr>
<td>Life and physical sciences (p. 20)</td>
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<td>Social and behavioral sciences (p. 23)</td>
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<td>American history (p. 23)</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>International and cultural diversity (p. 34)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Free electives</td>
<td></td>
<td>22</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 15

1 Taught as part of POLS Summer Research Academy.

Comparative Study of National Politics - Certificate

The Certificate in Comparative Study of National Politics is a means of enhancing undergraduate education through a focused combination of courses and study abroad. Administered by the Department of Political Science, the program is open to all Texas A&M University undergraduates, regardless of major. Students interested in gaining background for postgraduate studies in comparative politics or comparative public policy, for a career in the U.S. Foreign Service or international aid work, or for careers in areas such as international business, marketing, or law may wish to pursue this certificate.

This certificate program requires 18 hours of coursework, including a capstone course involving comparative politics research. It also requires participation in a study abroad program. The 18 semester hours of coursework can be accommodated within the regular undergraduate curriculum. Students are encouraged to begin planning as freshmen to avoid the addition of extra hours to the degree plan. Certificate requirements are specified in a current brochure available in the Department of Political Science’s Undergraduate Programs Office, Allen Building, room 2024.

Successful completion of the program will be indicated on the student’s transcript. Each student will receive a program certificate upon graduation from Texas A&M.
## Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
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<tr>
<td>POLS 481</td>
<td>Research Seminar (comparative politics research)</td>
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Select four of the following: 1

<table>
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<th>Course</th>
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<tr>
<td>POLS 312</td>
<td>Ethnic Conflict</td>
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<tr>
<td>POLS 322</td>
<td>Western European Government and Politics</td>
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<td>POLS 323</td>
<td>Political Systems of Latin America</td>
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<td>POLS 324</td>
<td>Politics of Global Inequality</td>
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<td>POLS 326</td>
<td>Government and Politics of Eastern Europe</td>
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<tr>
<td>POLS 328</td>
<td>Globalization and Democracy</td>
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<td>POLS 338</td>
<td>Government and Politics of the Former Soviet Union</td>
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<tr>
<td>POLS 358</td>
<td>Comparative Judicial Politics</td>
<td></td>
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<tr>
<td>POLS 365/ ASIA 365</td>
<td>Asian Governments and Politics</td>
<td></td>
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<tr>
<td>POLS 424</td>
<td>Comparative Governmental Institutions</td>
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<td>POLS 432</td>
<td>The Politics of European Union</td>
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<tr>
<td>POLS 475</td>
<td>Government and the Economy</td>
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<td>HIST 336</td>
<td>Europe Since 1932</td>
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<td>HIST 338</td>
<td>The Rise of the European Middle Class</td>
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<td>HIST 339</td>
<td>Eastern Europe Since 1453</td>
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<tr>
<td>HIST 342</td>
<td>Latin America Since 1810</td>
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<td>HIST 345/ ASIA 345</td>
<td>Modern Africa</td>
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<td>HIST 348</td>
<td>Modern Middle East</td>
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<td>HIST 352/ ASIA 352</td>
<td>Modern East Asia</td>
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<td>HIST 355/ ASIA 355</td>
<td>Modern China</td>
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<td>HIST 356/ ASIA 356</td>
<td>Twentieth Century Japan</td>
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<td>HIST 404</td>
<td>Post 1945 Germanies</td>
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<tr>
<td>HIST 407</td>
<td>History of France Since 1815</td>
<td></td>
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<tr>
<td>HIST 412</td>
<td>Soviet Union 1917-1991</td>
<td></td>
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<tr>
<td>HIST 421</td>
<td>European Intellectual History in the Twentieth Century</td>
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<td>HIST 439</td>
<td>Twentieth Century England</td>
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<tr>
<td>HIST 441</td>
<td>History of Mexico, 1821 to the Present</td>
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<td>HIST 449</td>
<td>History of Brazil, 1822 to the Present</td>
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<td>HIST 477/ WGST 477</td>
<td>Women in Modern European History</td>
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<td>ECON 312</td>
<td>Poverty, Inequality and Social Policy</td>
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<td>ECON 320</td>
<td>Economic Development of Europe</td>
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<td>ECON 324</td>
<td>Comparative Economic Systems</td>
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<tr>
<td>SOCI 413</td>
<td>Social Movements</td>
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</table>

**Total Semester Credit Hours** 18

1 Students are required to complete courses from the following list, at least three of which must be from political science.

### European Union Politics - Certificate

The Certificate in European Union Politics is an initiative of the European Union Center and the Department of Political Science. Both interdisciplinary and international in its orientation, the Certificate program offers students seeking a Bachelor of Arts or Bachelor of Science degree at Texas A&M University the opportunity to combine courses, intermediate level foreign language skills, and study abroad.

Certificate requirements include 23 semester hours of coursework including an approved study abroad program. The 23 semester hours of coursework can be accommodated within the regular undergraduate curriculum. Students are encouraged to begin planning as freshmen to avoid the addition of extra hours to the degree plan. Certificate requirements are specified in a current brochure available in the Department of Political Science’s Undergraduate Program Office, Allen Building, room 2024.

Successful completion of the program will be indicated on the student’s transcript. Each student will also receive a program certificate upon graduation from Texas A&M University.

## Program Requirements

### Track 1 - European Semester

#### Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS 306</td>
<td>Contemporary Political Problems and Issues (Political Systems of the EU and its Decision Making Process)</td>
<td>3</td>
</tr>
<tr>
<td>POLS 306</td>
<td>Contemporary Political Problems and Issues (European Law)</td>
<td>3</td>
</tr>
<tr>
<td>POLS 306</td>
<td>Contemporary Political Problems and Issues (European Markets and Economy)</td>
<td>3</td>
</tr>
<tr>
<td>LBAR 331</td>
<td>Studies in European Civilization and Culture I</td>
<td>3</td>
</tr>
<tr>
<td>LBAR 332</td>
<td>Studies in European Civilization and Culture II</td>
<td>3</td>
</tr>
<tr>
<td>European language (Danish, Dutch, Finnish, French, German, Greek, Italian, Portuguese, Spanish, or Swedish)</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours** 23

1 Danish, Dutch, Finnish, Greek, Portuguese and Swedish are not offered at Texas A&M.

### Track 2 - Summer EU Study

#### Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS 306</td>
<td>Contemporary Political Problems and Issues 1</td>
<td>3</td>
</tr>
<tr>
<td>POLS 306</td>
<td>Contemporary Political Problems and Issues 1</td>
<td>3</td>
</tr>
<tr>
<td>European language (Danish, Dutch, Finnish, French, German, Greek, Italian, Portuguese, Spanish, or Swedish)</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Select three of the following: 9

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS 424</td>
<td>Comparative Governmental Institutions</td>
<td></td>
</tr>
<tr>
<td>POLS 322</td>
<td>Western European Government and Politics</td>
<td></td>
</tr>
<tr>
<td>POLS 326</td>
<td>Government and Politics of Eastern Europe</td>
<td></td>
</tr>
<tr>
<td>POLS 432</td>
<td>The Politics of European Union</td>
<td></td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours** 23
1 Taught in the TAMU Summer European Academy or the Danube Summer Institute.

2 Danish, Dutch, Finnish, Greek, Portuguese and Swedish are not offered at Texas A&M.

Track 3 - EU study abroad REEP or Equivalent

Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS 322</td>
<td>Western European Government and Politics</td>
<td>3</td>
</tr>
<tr>
<td>POLS 326</td>
<td>Government and Politics of Eastern Europe</td>
<td>3</td>
</tr>
<tr>
<td>POLS 432</td>
<td>The Politics of European Union</td>
<td>3</td>
</tr>
<tr>
<td>POLS 306</td>
<td>Contemporary Political Problems and Issues</td>
<td>3</td>
</tr>
<tr>
<td>European language (Danish, Dutch, Finnish, French, German, Greek, Italian, Portuguese, Spanish, or Swedish)</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>LBAR 331</td>
<td>Studies in European Civilization and Culture</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 23

1 Taught at TAMU or equivalent course at a European university.

2 Danish, Dutch, Finnish, Greek, Portuguese and Swedish are not offered at Texas A&M.

Foundations of Political Theory - Certificate

The Certificate in Foundations of Political Theory is a means of enhancing undergraduate education through a focused combination of courses, independent study and program participation. Administered by the Department of Political Science, the program is open to all Texas A&M University undergraduates, regardless of major. Students may choose one of two areas of concentration: history of political theory, or analytic political theory. Students interested in gaining background for post-graduate studies in law, social science, history or political theory, or for a fulfilling career that builds on other analytical and expressive skills may wish to pursue this certificate.

This certificate requires 18 hours of coursework, including an introductory course in political theory and a capstone senior research course on a relevant topic. The 18 semester hours of coursework can be accommodated within the regular undergraduate curriculum. Students are encouraged to begin planning as freshmen to avoid the addition of extra hours to the degree plan. Certificate requirements are specified in a current brochure available in the Department of Political Science’s Undergraduate Programs Office, Allen Building, room 2024.

Successful completion of the program will be indicated on the student’s transcript. Each student will receive a program certificate upon graduation from Texas A&M.

Program Requirements

History of Political Theory Concentration

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS 481</td>
<td>Research Seminar</td>
<td>3</td>
</tr>
<tr>
<td>POLS 203</td>
<td>Introduction to Political Theory</td>
<td>3</td>
</tr>
<tr>
<td>POLS 349</td>
<td>Early Political Thought</td>
<td>3</td>
</tr>
<tr>
<td>POLS 350</td>
<td>Modern Political Thought</td>
<td>3</td>
</tr>
</tbody>
</table>

Select two of the following: 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS 359</td>
<td>American Political Thought</td>
<td></td>
</tr>
<tr>
<td>POLS 364</td>
<td>Global Political Thought</td>
<td></td>
</tr>
<tr>
<td>POLS 455</td>
<td>Traditions of Political Theory</td>
<td></td>
</tr>
<tr>
<td>POLS 461</td>
<td>Jurisprudence</td>
<td></td>
</tr>
<tr>
<td>HIST 420</td>
<td>European Intellectual History from the Enlightenment to 1900</td>
<td></td>
</tr>
<tr>
<td>HIST 421</td>
<td>European Intellectual History in the Twentieth Century</td>
<td></td>
</tr>
<tr>
<td>COMM 301</td>
<td>Rhetoric in Western Thought</td>
<td></td>
</tr>
<tr>
<td>COMM 327</td>
<td>American Oratory</td>
<td></td>
</tr>
<tr>
<td>ENGL 353</td>
<td>History of Rhetoric</td>
<td></td>
</tr>
<tr>
<td>PHIL 332</td>
<td>Social and Political Philosophy</td>
<td></td>
</tr>
<tr>
<td>PHIL 410</td>
<td>Classical Philosophy</td>
<td></td>
</tr>
<tr>
<td>PHIL 411</td>
<td>Medieval Philosophy</td>
<td></td>
</tr>
<tr>
<td>PHIL 413</td>
<td>Eighteenth-Century Philosophy</td>
<td></td>
</tr>
<tr>
<td>PHIL 414</td>
<td>Nineteenth Century Philosophy</td>
<td></td>
</tr>
<tr>
<td>PHIL 415</td>
<td>American Philosophy</td>
<td></td>
</tr>
<tr>
<td>ENGL 308</td>
<td>History of Literary Criticism</td>
<td></td>
</tr>
<tr>
<td>POLS 306</td>
<td>Contemporary Political Problems and Issues</td>
<td></td>
</tr>
<tr>
<td>POLS 485</td>
<td>Directed Studies</td>
<td></td>
</tr>
<tr>
<td>POLS 489</td>
<td>Special Topics in...</td>
<td></td>
</tr>
<tr>
<td>POLS 497</td>
<td>Independent Honors Studies</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 18

1 Courses, and similar courses in other disciplines, may qualify when focused specifically on the history of political theory or topics of significant substance or importance. Consult an Undergraduate Advisor in the Political Science Department to determine if the course would be accepted toward the certificate.

Analytical Political Theory Concentration

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS 481</td>
<td>Research Seminar</td>
<td>3</td>
</tr>
<tr>
<td>POLS 203</td>
<td>Introduction to Political Theory</td>
<td>3</td>
</tr>
<tr>
<td>POLS 369</td>
<td>Theories of Democracy</td>
<td>3</td>
</tr>
<tr>
<td>POLS 454</td>
<td>Contemporary Political Ideas</td>
<td>3</td>
</tr>
</tbody>
</table>

Select two of the following: 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS 364</td>
<td>Global Political Thought</td>
<td></td>
</tr>
<tr>
<td>POLS 353</td>
<td>Constitutional Rights and Liberties</td>
<td></td>
</tr>
<tr>
<td>POLS 359</td>
<td>American Political Thought</td>
<td></td>
</tr>
<tr>
<td>POLS 455</td>
<td>Traditions of Political Theory</td>
<td></td>
</tr>
<tr>
<td>POLS 462/ WGST 462</td>
<td>Women and the Law</td>
<td></td>
</tr>
<tr>
<td>HIST 420</td>
<td>European Intellectual History from the Enlightenment to 1900</td>
<td></td>
</tr>
<tr>
<td>HIST 421</td>
<td>European Intellectual History in the Twentieth Century</td>
<td></td>
</tr>
<tr>
<td>COMM 301</td>
<td>Rhetoric in Western Thought</td>
<td></td>
</tr>
<tr>
<td>COMM 327</td>
<td>American Oratory</td>
<td></td>
</tr>
<tr>
<td>ENGL 354</td>
<td>Modern Rhetorical Theory</td>
<td></td>
</tr>
<tr>
<td>ENGL 401</td>
<td>Contemporary Literary Theory</td>
<td></td>
</tr>
<tr>
<td>PHIL 332</td>
<td>Social and Political Philosophy</td>
<td></td>
</tr>
<tr>
<td>PHIL 307</td>
<td>Philosophy of the Social Sciences</td>
<td></td>
</tr>
<tr>
<td>PHIL 419</td>
<td>Current Continental Philosophy</td>
<td></td>
</tr>
</tbody>
</table>
International Relations - Certificate

The Certificate in International Relations is a means of enhancing undergraduate education through a focused combination of courses, an optional internship, and language development. Administered by the Department of Political Science, the program is open to all Texas A&M University undergraduates, regardless of major. This certificate program provides essential knowledge and skills for students interested in postgraduate studies in international relations, careers in the U.S. Foreign Service, international intelligence, law enforcement, or as a military officer; or for job recruitment in areas such as international law or finance.

This certificate requires 18 hours of coursework, including a capstone course involving international relations research. Up to six of the 18 hours may be earned in connection with participation in an internship program. The 18 semester hours of coursework can be accommodated within the regular undergraduate curriculum. Students are encouraged to begin planning as freshmen to avoid the addition of extra hours to the degree plan. Certificate requirements are specified in a current brochure available in the Department of Political Science’s Undergraduate Programs Office, Allen Building, room 2024.

Successful completion of the program will be indicated on the student’s transcript. Each student will receive a program certificate upon graduation from Texas A&M.

Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS 481</td>
<td>Research Seminar (topic is international relations)</td>
<td>3</td>
</tr>
<tr>
<td>Select five of the following:</td>
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</tr>
<tr>
<td>POLS 306</td>
<td>Contemporary Political Problems and Issues</td>
<td>2</td>
</tr>
<tr>
<td>POLS 324</td>
<td>Politics of Global Inequality</td>
<td></td>
</tr>
<tr>
<td>POLS 328</td>
<td>Globalization and Democracy</td>
<td></td>
</tr>
<tr>
<td>POLS 413</td>
<td>American Foreign Policy</td>
<td></td>
</tr>
<tr>
<td>POLS 415</td>
<td>Contemporary Issues in American Foreign Policy</td>
<td></td>
</tr>
<tr>
<td>POLS 423</td>
<td>U.S.-Latin American Relations</td>
<td></td>
</tr>
<tr>
<td>POLS 429</td>
<td>Issues in World Politics</td>
<td></td>
</tr>
<tr>
<td>POLS 432</td>
<td>The Politics of European Union</td>
<td></td>
</tr>
<tr>
<td>POLS 447</td>
<td>National Security Policy</td>
<td></td>
</tr>
<tr>
<td>POLS 485</td>
<td>Directed Studies</td>
<td>2</td>
</tr>
<tr>
<td>POLS 489</td>
<td>Special Topics in...</td>
<td>2</td>
</tr>
<tr>
<td>POLS 497</td>
<td>Independent Honors Studies</td>
<td>2</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 18

1 Courses, and similar courses in other disciplines, may qualify when focused specifically on the history of political theory or topics of significant substance or importance. Consult an Undergraduate Advisor in the Political Science Department to determine if the course would be accepted toward the certificate.

Law, Politics, and Society - Certificate

The Certificate in Law, Politics and Society is a means of enhancing undergraduate education through a focused combination of courses and individualized research instruction. Administered by the Department of Political Science, the program is open to all Texas A&M University undergraduates, regardless of major. The program offers an intellectually-rigorous, research-oriented foundation for post-graduate studies focusing on the politics of law, courts, and legal systems or for preparation for law school and the legal profession.

This certificate requires 18 hours of coursework, including a capstone course involving doctrinal, empirical or comparative research into important socio-legal questions. The 18 semester hours of coursework can be accommodated within the regular undergraduate curriculum. Students are encouraged to begin planning as freshmen to avoid the addition of extra hours to the degree plan. Certificate requirements are specified in a current brochure available in the Department of Political Science’s Undergraduate Programs Office, Allen Building, room 2024.

Successful completion of the program will be indicated on the student’s transcript. Each student will receive a program certificate upon graduation from Texas A&M.

Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS 481</td>
<td>Research Seminar</td>
<td>3</td>
</tr>
<tr>
<td>Doctrinal concentration</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Select two of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POLS 353</td>
<td>Constitutional Rights and Liberties</td>
<td></td>
</tr>
<tr>
<td>POLS 355</td>
<td>United States Constitutional Development</td>
<td></td>
</tr>
<tr>
<td>POLS 461</td>
<td>Jurisprudence</td>
<td></td>
</tr>
</tbody>
</table>

1 No more than two courses can be taken outside of Political Science.
2 Course qualifies when focused specifically on international relations. Consult an Undergraduate Advisor in the Political Science Department to determine if course would be accepted toward certificate.

Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS 481</td>
<td>Research Seminar</td>
<td>3</td>
</tr>
<tr>
<td>Doctrinal concentration</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Select two of the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>POLS 353</td>
<td>Constitutional Rights and Liberties</td>
<td></td>
</tr>
<tr>
<td>POLS 355</td>
<td>United States Constitutional Development</td>
<td></td>
</tr>
<tr>
<td>POLS 461</td>
<td>Jurisprudence</td>
<td></td>
</tr>
</tbody>
</table>
Race, Ethnicity, and Gender Politics - Certificate

The Certificate in Race, Ethnicity, and Gender Politics is a means of enhancing undergraduate education through a focused program of courses and program participation. Administered by the Department of Political Science, the program is open to all Texas A&M University undergraduates, regardless of major. The program provides a valuable background for postgraduate studies in law, social science, history, public policy, or for a fulfilling career that builds on students' analytical and expressive skills.

The program requires 18 hours of coursework and program participation. Students are encouraged to begin planning as freshmen to avoid the addition of extra hours to the degree plan. Certificate requirements are specified in a current brochure available in the Department of Political Science's Undergraduate Programs Office, Allen Building, room 2024.

Successful completion of the program will be indicated on the student's transcript. Each student will receive a program certificate upon graduation from Texas A&M.

Program Requirements

Select three of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS 304</td>
<td>Latino Politics in the United States</td>
</tr>
<tr>
<td>POLS 312</td>
<td>Ethnic Conflict</td>
</tr>
</tbody>
</table>
ANTH 404/ WGST 404
Women and Culture
Attendance at three University lectures on relevant topics

Total Semester Credit Hours 18

1 Three courses must be from Political Science.
2 Course, and similar courses in other disciplines, qualifies when focused specifically on race, ethnicity, or gender politics or on closely related topics of significant substance or importance. Consult an Undergraduate Advisor in the Political Science Department to determine if course would be accepted toward certificate.
3 Course qualifies when taught with significant focus on race, ethnicity, or gender politics or clearly related topics. Consult an Undergraduate Advisor in the Political Science Department to determine if course would be accepted toward certificate.

Department of Psychology

Psychology majors receive a rigorous program of undergraduate education and training that encourages critical thinking and life long learning. The curriculum leading to a degree in psychology provides students with an understanding of human behavior and the ability to utilize scientific methods to answer questions about human behavior. Students are prepared to enter a variety of graduate and professional programs in psychology and related fields (such as law, medical school), as well as to enter entry-level employment in a number of fields (such as business, human resources).

BA/BS Degrees: Students majoring in psychology may earn either the Bachelor of Arts or Bachelor of Science degree. The psychology course requirements for the two degrees are identical; they differ with respect to the requirements in other disciplines. For example, the BA degree requires courses in a foreign language and extra humanities hours, whereas the BS degree requires additional hours in the physical and biological sciences. The two degrees are offered to allow students to complete their non-psychology course of study in fields of greatest interest to them. Thus, students who have stronger interests in the sciences would probably pursue the BS degree, whereas those with stronger interests in foreign language and the humanities would pursue the BA degree.

Both degrees provide students with the necessary curriculum requirements to pursue graduate study in psychology in most institutions, as well as in other professional fields such as law. Students planning to apply to medical schools are advised to select the BS degree program.

Honors: Students who qualify for the University Honors Program should contact the Department of Psychology about the department’s own honors program which places an emphasis on small classes and independent research experience.

Minors: A non-psychology minor is optional for psychology majors. If chosen, a minor must consist of 15–18 credit hours, no more than 9 of which may be lower division and must be declared before the student completes 90 credit hours. No more than 6 hours from the minor may be used to fulfill other Core requirements. A grade of C or higher is required if a course is to be counted in the major or minor field. A psychology minor is available for non-psychology majors (see below). A neuroscience minor is available to both psychology and non-psychology majors. For more information, visit the Neurosciences (http://tamin.tamu.edu) website. For more information about Psychology undergraduate programs, please visit the Department of Psychology (http://psychology.tamu.edu) website.

Faculty

Alexander, Gerianne M, Professor
Psychology
PhD, McGill University, 1991

Arthur, Winfred Jr., Professor
Psychology
PhD, University of Akron, 1988

Balsis, Stephen M, Associate Professor
Psychology
PhD, Washington University in St. Louis, 2008

Barnhardt, Terrence M, Instructional Associate Professor
Psychology
PhD, University of Arizona, 1993

Bergman, Mindy E, Professor
Psychology
PhD, University of Illinois at Urbana-Champaign, 2001

Bernard, Jessica A., Assistant Professor
Psychology
PhD, University of Michigan, 2012

Bodden, Jack L, Lecturer
Psychology
PhD, Ohio State University, 1969

Carter Sowell, Adrienne R, Assistant Professor
Psychology
PhD, Purdue University, 2010

Clifford, Patrick S, Lecturer
Psychology
PhD, Texas A&M University, 2013

Davidson, Emily S, Associate Professor
Psychology
PhD, State University of New York at Stony Brook, 1975

Donnellan, Michael B, Professor
Psychology
PhD, University of California, Davis, 2001

Edens, John F, Professor
Psychology
PhD, Texas A&M University, 1996

Edens, Pamela S, Lecturer
Psychology
PhD, Texas A&M University, 1997

Eitan, Shoshana, Associate Professor
Psychology
PhD, Weizmann Institute of Science, 1997

Fields, Shereece A, Assistant Professor
Psychology
PhD, University of South Florida, 2008

Geraci, Lisa D, Associate Professor
Psychology
PhD, State University of New York at Stony Brook, 2001
Grau, James W, Professor
Psychology
PhD, University of Pennsylvania, 1985

Heffer, Robert W, Clinical Professor
Psychology
PhD, Louisiana State University, 1988

Hicks, Joshua A, Associate Professor
Psychology
PhD, University of Missouri, 2009

Lench, Heather C, Associate Professor
Psychology
PhD, University of California, Irvine, 2007

Leunes, Arnold D, Professor
Psychology
EdD, North Texas State University, 1969
PhD, North Texas State College, 1969

Maren, Stephen A, Professor
Psychology
PhD, University of Southern California, 1993

Mathur, Vani A, Assistant Professor
Psychology
PhD, Northwestern University, 2012

Meagher, Mary W, Professor
Psychology
PhD, University of North Carolina at Chapel Hill, 1989

Miner, Kathi N, Assistant Professor
Psychology
PhD, University of Michigan, 2004

Morey, Leslie C, Professor
Psychology
PhD, University of Florida, 1981

Nagaya, Naomi, Research Assistant Professor
Psychology
PhD, University of Southern California, 1993

Orr, Joseph M, Assistant Professor
Psychology
PhD, University of Michigan, 2011

Packard, Mark G, Professor
Psychology
PhD, McGill University, 1991

Payne, Stephanie C, Professor
Psychology
PhD, George Mason University, 2000

Rhodes, William S, Professor
Psychology
PhD, Princeton University, 1978

Salter, Phia S, Assistant Professor
Psychology
PhD, University of Kansas, 2010

Samuelson, Charles D, Associate Professor
Psychology
PhD, University of California, Santa Barbara, 1986

Schlegel, Rebecca J, Associate Professor
Psychology
PhD, University of Missouri, 2009

Schmeichel, Brandon J, Professor
Psychology
PhD, Florida State University, 2005

Schumacher, Jay S, Lecturer
Psychology
PhD, Texas A&M University, 1999

Smallman, Rachel E, Assistant Professor
Psychology
PhD, University of Illinois at Urbana-Champaign, 2010

Smith, Rachel, Assistant Professor
Psychology
PhD, University of Pennsylvania, 2008

Smith, Steven M, Professor
Psychology
PhD, University of Wisconsin-Madison, 1979

Snyder, Douglas K, Professor
Psychology
PhD, University of North Carolina at Chapel Hill, 1978

Stagner, Brian H, Clinical Professor
Psychology
PhD, University of Massachusetts, 1982

Vaid, Jyotsna, Professor
Psychology
PhD, McGill University, 1982

Van Widenfelt, Brigit M, Clinical Assistant Professor
Psychology
PhD, The Catholic University of America, 1995

Wellman, Paul J, Professor
Psychology
PhD, Iowa State University, 1980

Wilcox, Teresa G, Professor
Psychology
PhD, University of Arizona, 1993

Woods, Douglas W, Professor
Psychology
PhD, Western Michigan University, 1999

Worthy, Darrell A, Associate Professor
Psychology
PhD, University of Texas, 2010

Yamauchi, Takashi, Associate Professor
Psychology
PhD, Columbia University, 1997

Majors
Minors

- Psychology Minor (p. 493)

Psychology - BA

The Department of Psychology offers a Bachelor of Arts in Psychology. Students interested in studying human behavior, with a humanities-oriented curriculum, would pursue a BA degree. The BA can successfully prepare students interested in graduate and professional programs that stress a humanities background (e.g., counseling, social work, management, law), as well as students interested in employment in business or applied psychology.

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
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<tbody>
<tr>
<td>PSYC 107</td>
<td>Introduction to Psychology</td>
<td>3</td>
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<tr>
<td>PSYC 203 &amp; PSYC 204</td>
<td>Elementary Statistics for Psychology and Experimental Psychology</td>
<td>8</td>
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<tr>
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<tr>
<td>PSYC 306</td>
<td>Abnormal Psychology</td>
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<td>PSYC 307</td>
<td>Developmental Psychology</td>
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<td>PSYC 315</td>
<td>Social Psychology</td>
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<td>PSYC 319</td>
<td>History and Systems of Psychology</td>
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<td>PSYC 330</td>
<td>Personlity</td>
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<td>PSYC 352</td>
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<td>PSYC 320/ NRSC 320</td>
<td>Sensation-Perception</td>
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<td>PSYC 340/ NRSC 340</td>
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<td>PSYC 345</td>
<td>Human Cognitive Processes</td>
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<td>PSYC 206/ AFST 206</td>
<td>Black Psychology</td>
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<td>PSYC 208/ AFST 208</td>
<td>Stereotypes, Prejudice, and Minority Experience</td>
<td></td>
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<td>PSYC 209/ AFST 209</td>
<td>Psychology of Culture and Diversity</td>
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<tr>
<td>PSYC 210</td>
<td>Psychological Aspects of Human Sexuality</td>
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<td>PSYC 300/ WGST 300</td>
<td>Psychology of Women</td>
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<td>PSYC 405/ RELS 405</td>
<td>Psychology of Religion</td>
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<td>Psychology electives (p. 950)</td>
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<td>College and University Requirements</td>
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<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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</table>

Total Semester Credit Hours: 120

1. Enrollment freshman year is strongly recommended.
2. Enrollment sophomore year is strongly recommended.
3. No more than a combined maximum of 6 hours of PSYC 484, PSYC 485, or PSYC 485H are permitted.
4. Exceptions are MATH 150, MATH 167, MATH 365, MATH 366.
5. Courses in psychology may not be used to satisfy this requirement.
6. Other courses in American and Texas history may be used; however, courses solely about Texas history may not comprise more than 3 semester credit hours.
7. Course may be used to satisfy any other requirement.
8. No more than 9 hours of any combination of military science, naval science, aerospace studies and physical activity may be counted. A minor field of study may fulfill this requirement, but a minor is not required.

No more than 35 hours in psychology may be applied to the degree.

A grade of C or higher is required if a course is to be counted in the major field. A student must complete a minimum of 36 hours of 300- and 400-level courses at Texas A&M.

No course can be counted in more than one category.

Psychology - BS

The Department of Psychology offers a Bachelor of Science in Psychology. Students interested in studying human behavior, with a science-oriented curriculum, would pursue a BS degree. The BS can successfully prepare students interested in further study in a science-oriented psychology graduate program (such as neuroscience) or medical school, or other health-related graduate and professional programs (e.g., pharmacy, physical therapy), as well as students interested in entry-level positions in business or applied psychology.

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
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<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
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<td>Foreign Language (p. 405)</td>
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<tr>
<td>Mathematics</td>
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<tr>
<td>Select two of the following:</td>
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<tr>
<td>MATH 131-MATH 467 (p. 860)</td>
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<tr>
<td>PHIL 240</td>
<td>Introduction to Logic</td>
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<tr>
<td>Literature in English (p. 405)</td>
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<td>Social and behavioral science (p. 23)</td>
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<tr>
<td>Life and physical sciences (p. 20)</td>
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<td>POLS 206</td>
<td>American National Government</td>
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<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
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<td>HIST 105</td>
<td>History of the United States</td>
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<td>HIST 106</td>
<td>History of the United States</td>
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<tr>
<td>International and cultural diversity (p. 34)</td>
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<tr>
<td>Electives</td>
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<td>14</td>
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</table>

Total Semester Credit Hours: 120

1. Enrollment freshman year is strongly recommended.
2. Enrollment sophomore year is strongly recommended.
3. No more than a combined maximum of 6 hours of PSYC 484, PSYC 485, or PSYC 485H are permitted.
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7. Course may be used to satisfy any other requirement.
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No more than 35 hours in psychology may be applied to the degree.

A grade of C or higher is required if a course is to be counted in the major field. A student must complete a minimum of 36 hours of 300- and 400-level courses at Texas A&M.

No course can be counted in more than one category.
PSYC 107 Introduction to Psychology  3
PSYC 203 Elementary Statistics for Psychology and Experimental Psychology  8
Select two of the following:  6
PSYC 306 Abnormal Psychology
PSYC 307 Developmental Psychology
PSYC 315 Social Psychology
PSYC 319 History and Systems of Psychology
PSYC 330 Personality
PSYC 352 Organizational Psychology
Select two of the following:  6
PSYC 311/ NRSC 311 Comparative Psychology
NRSC 320 Sensation-Perception
NRSC 333 Biology of Psychological Disorders
NRSC 335 Physiological Psychology
NRSC 340 Psychology of Learning
NRSC 345 Human Cognitive Processes
Select one of the following:  3
PSYC 206/ AFST 206 Black Psychology
PSYC 208/ AFST 208 Stereotypes, Prejudice, and Minority Experience
PSYC 209/ AFST 209 Psychology of Culture and Diversity
PSYC 210 Psychological Aspects of Human Sexuality
PSYC 300/ WGST 300 Psychology of Women
PSYC 405/ RELS 405 Psychology of Religion
Psychology electives (p. 950)  9

College and University Requirements

Communication
ENGL 104 Composition and Rhetoric  3
ENGL 210 Technical and Business Writing  3
Mathematics
Select two of the following:  6
MATH 131-MATH 467 (p. 860)  4
PHIL 240 Introduction to Logic
Literature in English (p. 405)  6
Language, philosophy and culture and Creative arts (p. 405)  9
Social and behavioral science (p. 23)  5
Life and physical sciences (p. 20)  21
International and cultural diversity (p. 34)  6
American history (p. 23)  6
POLS 206 American National Government  3
POLS 207 State and Local Government  3

Electives  5, 7  19

Total Semester Credit Hours  120

1. Enrollment freshman year is strongly recommended.
2. Enrollment sophomore year is strongly recommended.
3. No more than a combined maximum of 6 hours of PSYC 484, PSYC 485, or PSYC 485H are permitted.
4. Exceptions are MATH 150, MATH 167, MATH 365, MATH 366.
5. Courses in psychology may not be used to satisfy this requirement.
6. Course may be used to satisfy any other requirement.
7. No more than 9 hours of any combination of military science, naval science, aerospace studies and physical activity may be counted. A minor field of study may fulfill this requirement, but a minor is not required.

No more than 35 hours in psychology may be applied to the degree.
A grade of C or higher is required if a course is to be counted in the major field.
No course can be counted in more than one category.

Psychology - Minor

A Psychology minor is available for non-psychology majors. The minor must be declared before the student has completed 90 credit hours.

Program Requirements

PSYC 107 Introduction to Psychology  3
PSYC 200-PSYC 499 (p. 950)  3
PSYC 300-PSYC 499 (p. 950)  9

Total Semester Credit Hours  15

1. PSYC 484, PSYC 485 and PSYC 491 do not count toward the minor.
2. Registration in PSYC 203 and PSYC 204 is limited to PSYC majors only.

At least 9 semester credit hours of PSYC courses above the 200-level must be taken at Texas A&M.
Students must make a grade of "C" or better in all courses.

Department of Sociology

Sociology is the scientific study of society. The discipline examines all aspects of human behavior, especially those involving interpersonal relationships and the development of social structures.

The Department of Sociology offers courses in such areas as the family, racial and ethnic relations, demography, social stratification and inequality, social psychology, complex organizations, community, environment, criminology, the sociology of religion, global sociology and social change.

Sociological training is useful in a broad variety of occupations. Our coursework provides an understanding of the forces behind individual opinions and beliefs, organizational behavior, social trends and world events. These skills are critical to marketing, law, human resources, journalism, government and strategic management. Sociology is the best form of training for entry into the helping professions like social services.
and law enforcement, and it provides an outstanding foundation for business and industry.

**Faculty**

Burk, James S, Professor  
Sociology  
PhD, University of Chicago, 1982

Campbell, Mary E, Associate Professor  
Sociology  
PhD, University of Wisconsin-Madison, 2004

Cohn, Samuel R, Professor  
Sociology  
PhD, University of Michigan, 1981

Dietrich, Katheryn A, Instructional Associate Professor  
Sociology  
PhD, Texas A&M University, 1994

Eason, John M, Assistant Professor  
Sociology  
PhD, University of Chicago, 2008

Feagin, Joe R, Professor  
Sociology  
PhD, Harvard University, 1966

Fossett, Mark A, Professor  
Sociology  
PhD, University of Texas, Austin, 1983

Foster, Holly A, Associate Professor  
Sociology  
PhD, University of Toronto, 2001

Gatson, Sarah N, Associate Professor  
Sociology  
PhD, Northwestern University, 1999

Goldsmith, Patrick A, Associate Professor  
Sociology  
PhD, University Of Arizona, 1999

Henderson, Mary K, Associate Professor  
Sociology  
PhD, University of California, San Diego, 1991

Jewell, Joseph O, Associate Professor  
Sociology  
PhD, University of California, Los Angeles, 1998

Keith, Verna M, Professor  
Sociology  
PhD, University of Kentucky, 1982

Lakkimsetti, Chaitanya, Assistant Professor  
Sociology  
PhD, University of Wisconsin, 2010

Linneman, Judith A, Instructional Assistant Professor  
Sociology  
PhD, Iowa State University, 1985

Liu, Dongxiao, Assistant Professor  
Sociology  
PhD, Harvard University, 2007

Mackin, Robert S, Instructional Assistant Professor  
Sociology  
PhD, University of Wisconsin-Madison, 1998

May, Reuben A, Professor  
Sociology  
PhD, University of Chicago, 1996

McIntosh, William A, Professor  
Sociology  
PhD, Iowa State University, 1975

Mestrovic, Stjepan G, Professor  
Sociology  
PhD, Syracuse University, 1982

Moore, Wendy A, Associate Professor  
Sociology  
PhD, University of Minnesota, 2005

Morris, Theresa M, Associate Professor  
Sociology  
PhD, Texas A&M University, 2000

Murguia, Edward, Professor  
Sociology  
PhD, University of Texas, 1978

Ono, Hiroshi, Associate Professor  
Sociology  
PhD, University of Chicago, 1999

Pals, Heili, Assistant Professor  
Sociology  
PhD, Stanford University, 2006

Plankey Videla, Nancy B, Associate Professor  
Sociology  
PhD, University of Wisconsin-Madison, 1998

Poston, Dudley L, Professor  
Sociology  
PhD, University of Oregon, 1968

Prechel, Harland N, Professor  
Sociology  
PhD, University of Kansas, 1986

Regan, Michael R, Lecturer  
Sociology  
PhD, Texas A&M University, 2010

Sakamoto, Arthur, Professor  
Sociology  
PhD, University of Wisconsin-Madison, 1988

Sell, Jane A, Professor  
Sociology  
PhD, Washington State University, 1979
Majors

- Bachelor of Arts in Sociology (p. 495)
- Bachelor of Science in Sociology (p. 496)

5-Year Degree Programs

- Bachelor of Arts in Sociology and Master of Public Service and Administration (p. 497)
- Bachelor of Science in Sociology and Master of Public Service and Administration (p. 497)

Minors

- Latino/a and Mexican-American Studies Minor (p. 499)
- Sociology Minor (p. 499)

Certificates

- Global Sociology Certificate (p. 499)
- Sociology of Gender Certificate (p. 500)
- Sociology of Race and Ethnicity Certificate (p. 500)

Sociology - BA

The Department of Sociology offers a Bachelor of Arts in Sociology.

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>SOCI 205</td>
<td>Introduction to Sociology</td>
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<tr>
<td>SOCI 220</td>
<td>Methods of Social Research</td>
<td>3</td>
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<tr>
<td>SOCI 230</td>
<td>Classical Sociological Theory</td>
<td>3</td>
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<td>SOCI 420</td>
<td>Advanced Methods of Social Research</td>
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<td>SOCI 430</td>
<td>Contemporary Sociological Theory</td>
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<td>SOCI 206-SOCI 499 (p. 976)</td>
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College and University Requirements

Communication

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<th>Title</th>
<th>Hours</th>
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<tr>
<td>ENGL 104</td>
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<tr>
<td>ENGL 203</td>
<td>Writing about Literature</td>
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<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
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<td>COMM 203</td>
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<td>COMM 205</td>
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<td>Argumentation and Debate</td>
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<td>Foreign language (p. 405)</td>
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<td>Life and physical sciences (p. 20)</td>
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<td>Language, philosophy and culture (p. 21)</td>
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<td>Creative arts (p. 22)</td>
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<tr>
<td>Language, philosophy and culture or Creative arts (p. 21)</td>
<td>3</td>
<td></td>
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<tr>
<td>Social and behavioral science (p. 23)</td>
<td>6</td>
<td></td>
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<tr>
<td>American history (p. 23)</td>
<td>5</td>
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<tr>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
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<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
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<tr>
<td>International and cultural diversity (p. 34)</td>
<td>6</td>
<td></td>
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</tbody>
</table>

Free electives | 19 |

Total Semester Credit Hours | 120 |

1 No more than 3 semester credit hours for SOCI 484 may be applied to the Bachelor of Arts degree in Sociology.
2 A grade of C or better is required for credit.
3 At least 3 hours must be in MATH except MATH 102, MATH 150, MATH 365, and MATH 366. Three hours may be PHIL 240.
4 SOCI courses do not count toward fulfilling this requirement.
5 Only American history courses fulfill this requirement.
6 Course may be used to satisfy any other requirement.

No more than 33 hours in sociology may be applied to the degree.

A grade of C or higher is required if a course is to be counted in the major field.

Other courses may qualify. Consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts or from departmental advisors. No more than one course may be counted in more than one category.

Please note that university requirements specify that all students must take at least two courses in their major that are designated as fulfilling a writing requirement (W). See the section on general requirements for baccalaureate degrees for more information.

Minor Field of Study

Sociology majors are not required to select a minor field of study. If chosen, the minor must consist of 15-18 hours, with no more than 9 hours taken at a 100- or 200-level. No more than six hours from the minor may be used to fulfill other requirements. A grade of C or higher is required if a course is to be counted in the minor field.

Teacher Certification

Non-Sociology Majors To Teach Sociology

Students desiring certification to teach sociology in Texas secondary schools must complete a social studies composite with a sociology emphasis and required education courses:

<table>
<thead>
<tr>
<th>Field</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>Sociology (p. 976)</td>
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</tr>
<tr>
<td>Political Science (p. 940)</td>
<td>9</td>
</tr>
<tr>
<td>Economics (p. 737)</td>
<td>6</td>
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<tr>
<td>Geography (p. 796)</td>
<td>10</td>
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<tr>
<td>History (p. 814)</td>
<td>18</td>
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</table>

Total Semester Credit Hours | 76
Sociology Majors To Teach Sociology

Sociology majors desiring certification must include the following among their sociology courses and required education courses:

Select one of the following: 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>SOCI 317/</td>
<td>Racial and Ethnic Relations</td>
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<td>AFST 317</td>
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<tr>
<td>SOCI 323/</td>
<td>Sociology of African Americans</td>
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<td>AFST 323</td>
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<tr>
<td>SOCI 403</td>
<td>Sociology of Latinos</td>
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Select one of the following: 3

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>SOCI 316/</td>
<td>Sociology of Gender</td>
</tr>
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<td>WGST 316</td>
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</tr>
<tr>
<td>SOCI 424/</td>
<td>Women and Work in Society</td>
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<td>WGST 424</td>
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<tr>
<td>SOCI 411</td>
<td>Social Psychology</td>
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</table>

Total Semester Credit Hours 6

Education Courses

More complete information on requests for teacher certification may be found in the College of Education and Human Development section under secondary certification.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>EDTC 345</td>
<td>Microcomputer Awareness for Educators</td>
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<tr>
<td>INST 210</td>
<td>Understanding Special Populations</td>
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<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
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<tr>
<td>TEFB 322</td>
<td>Teaching and Schooling in Modern Society</td>
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<tr>
<td>TEFB 323</td>
<td>Teaching Skills I</td>
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<tr>
<td>TEFB 324</td>
<td>Teaching Skills II</td>
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<td>TEFB 401</td>
<td>Language Arts in the Middle and Senior School</td>
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<td>TEFB 404</td>
<td>Social Studies in the Middle and Senior School</td>
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<tr>
<td>TEFB 406</td>
<td>Science in the Middle and Secondary School</td>
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<tr>
<td>TEFB 407</td>
<td>Mathematics in the Middle and Senior School</td>
</tr>
<tr>
<td>TEFB 426</td>
<td>Supervised Clinical Teaching</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 36

Students should consult an undergraduate Sociology advisor as early as possible to review the requirements of the social studies composite.

Sociology - BS

The Department of Sociology offers a Bachelor of Science in Sociology.

Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
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</tr>
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<tbody>
<tr>
<td>SOCI 205</td>
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<td>Contemporary Sociological Theory</td>
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<td>BUSH 635</td>
<td>Quantitative Methods in Public Management II: Policy Analysis Emphasis</td>
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SOCI 100-SOCI 499 (p. 976)

SOCI 608 Social Organization

SOCI 616 Political Sociology

College and University Requirements

Communication

<table>
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<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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Select one of the following: 3

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<td>ENGL 210</td>
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</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
</tr>
<tr>
<td>COMM 205</td>
<td>Communication for Technical Professions</td>
</tr>
<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
</tr>
</tbody>
</table>

Mathematics (p. 860)

Life and physical sciences (p. 20)

Language, philosophy and culture (p. 21)

Creative arts (p. 22)

Language, philosophy and culture or Creative arts (p. 21)

Social and behavioral sciences (p. 23)

American history (p. 23)

POLS 206 American National Government

POLS 207 State and Local Government

International and cultural diversity (p. 34)

General electives

Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSAA 601</td>
<td>Foundations of Public Service</td>
</tr>
<tr>
<td>PSAA 611</td>
<td>Public Policy Formation</td>
</tr>
<tr>
<td>PSAA 621</td>
<td>Economic Analysis</td>
</tr>
<tr>
<td>PSAA 622</td>
<td>Public Finance</td>
</tr>
<tr>
<td>PSAA 634</td>
<td>Public Management</td>
</tr>
<tr>
<td>PSAA elective</td>
<td></td>
</tr>
</tbody>
</table>

Any 100-499 course (except SOCI)

Total Semester Credit Hours 120

1 A grade of C or better is required for credit.
2 Three hours may be PHIL 240.
3 SOCI courses do not count toward fulfilling this requirement.
4 Only American history courses fulfill this requirement.
5 Course may be used to satisfy any other requirement.

No more than 33 hours in sociology may be applied to the degree.

A grade of C or higher is required if a course is to be counted in the major field.

Other courses may qualify. Consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts or from departmental advisors. No more than one course may be counted in more than one category.
Minor Field of Study

Sociology majors are not required to select a minor field of study. If chosen, the minor must consist of 15-18 hours, with no more than 9 hours taken at a 100- or 200-level. No more than six hours from the minor may be used to fulfill other requirements. A grade of C or higher is required if a course is to be counted in the minor field.

Sociology - 5-Year Bachelor of Arts/Master of Public Service Administration

The Department of Sociology and The Bush School of Government & Public Service offer a five year degree program leading to a Bachelor of Arts in Sociology and a Master of Public Service Administration.

Program Requirements

SOCI 205 Introduction to Sociology
SOCI 220 Methods of Social Research
SOCI 230 Classical Sociological Theory
SOCI 420 Advanced Methods of Social Research
SOCI 430 Contemporary Sociological Theory

Select from the following:
BUSH 635 Quantitative Methods in Public Management II: Policy Analysis Emphasis
BUSH 636 Quantitative Methods II: Game Theory Emphasis
PSAA 630 Program Evaluation in Public and Nonprofit Organizations
SOCI 100-SOCI 499 (p. 976)
SOCI 608 Social Organization
SOCI 616 Political Sociology

College and University Requirements

Communication
ENGL 104 Composition and Rhetoric

Select one of the following:
ENGL 203 Writing about Literature
ENGL 210 Technical and Business Writing
COMM 203 Public Speaking
COMM 205 Communication for Technical Professions
COMM 243 Argumentation and Debate

Literature in English (p. 405)
Modern language (p. 405)
Mathematics (p. 860)
Life and physical sciences (p. 20)
Language, philosophy and culture (p. 21)
Creative arts (p. 22)
Language, philosophy and culture or Creative arts (p. 21)
Social and behavioral science (p. 23)
American history (p. 23)
POLS 206 American National Government

POLS 207 State and Local Government
International and cultural diversity (p. 34)
General electives

Select one of the following:
PSAA 601 Foundations of Public Service
PSAA 611 Public Policy Formation
PSAA 621 Economic Analysis
PSAA 622 Public Finance
or PSAA 634 or Public Management
PSAA elective
Any 100-499 course (except SOCI)

Total Semester Credit Hours

1 A grade of C or better is required for credit.
2 At least 3 hours must be in MATH except MATH 102, MATH 150, MATH 365, and MATH 366. Three hours may be PHIL 240.
3 SOCI courses do not count toward fulfilling this requirement.
4 Only American history courses fulfill this requirement.
5 Course may be used to satisfy any other requirement.

No more than 33 hours in sociology may be applied to the degree.

A grade of C or higher is required if a course is to be counted in the major field.

Other courses may qualify. Consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts or from departmental advisors. No more than one course may be counted in more than one category.

Please note that university requirements specify that all students must take at least two courses in their major that are designated as fulfilling a writing requirement (W). See the section on general requirements for baccalaureate degrees for more information.

Minor Field of Study

Sociology majors are not required to select a minor field of study. If chosen, the minor must consist of 15-18 hours, with no more than 9 hours taken at a 100- or 200-level. No more than six hours from the minor may be used to fulfill other requirements. A grade of C or higher is required if a course is to be counted in the minor field.

Sociology - 5-Year Bachelor of Science/Master of Public Service Administration

The Department of Sociology and The Bush School of Government & Public Service offer a five year degree program leading to a Bachelor of Science in Sociology and a Master of Public Service Administration.

Program Requirements

SOCI 205 Introduction to Sociology
SOCI 220 Methods of Social Research
SOCI 230 Classical Sociological Theory
SOCI 420 Advanced Methods of Social Research
SOCI 430 Contemporary Sociological Theory
Sociology electives (p. 976)  

**College and University Requirements**

**Communication**

ENGL 104  Composition and Rhetoric  

Select one of the following:

- ENGL 203  Writing about Literature
- ENGL 210  Technical and Business Writing
- COMM 203  Public Speaking
- COMM 205  Communication for Technical Professions
- COMM 243  Argumentation and Debate

**Literature in English** (p. 405)  

**Mathematics** (p. 860)  

**Life and physical sciences** (p. 20)  

**Language, philosophy and culture** (p. 21)  

**Creative arts** (p. 22)  

**Social and behavioral sciences** (p. 23)  

**American history** (p. 23)  

**POLS 206**  American National Government  

**POLS 207**  State and Local Government  

**International and cultural diversity** (p. 34)  

**Free Electives**  

**Total Semester Credit Hours**  120

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1 No more than 3 credit hours for SOCI 484 may be applied to the Bachelor of Science degree in Sociology.
2 A grade of C or better is required for credit.
3 At least 3 hours must be in MATH except MATH 102, MATH 150, MATH 365, and MATH 366. Three hours may be PHIL 240.
4 SOCI courses do not count toward fulfilling this requirement.
5 Only American history courses fulfill this requirement.
6 Course may be used to satisfy any other requirement.

No more than 33 hours in sociology may be applied to the degree.

A grade of C or higher is required if a course is to be counted in the major field.

Other courses may qualify. Consult the approved list of courses available in the Undergraduate Student Services Office in the College of Liberal Arts or from departmental advisors. No more than one course may be counted in more than one category.

**Minor Field of Study**

Sociology majors are not required to select a minor field of study. If chosen, the minor must consist of 15-18 hours, with no more than 9 hours taken at a 100- or 200-level. No more than six hours from the minor may be used to fulfill other requirements. A grade of C or higher is required if a course is to be counted in the minor field.

---

**Teacher Certification**

**Non-Sociology Majors To Teach Sociology**

Students desiring certification to teach sociology in Texas secondary schools must complete a social studies composite with a sociology emphasis and required education courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sociology (p. 976)</td>
<td>33</td>
</tr>
<tr>
<td>Political Science (p. 940)</td>
<td>9</td>
</tr>
<tr>
<td>Economics (p. 737)</td>
<td>6</td>
</tr>
<tr>
<td>Geography (p. 796)</td>
<td>10</td>
</tr>
<tr>
<td>History (p. 814)</td>
<td>18</td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours**  76

**Sociology Majors To Teach Sociology**

Sociology majors desiring certification must include the following among their sociology courses and required education courses:

Select one of the following:  

1. SOCI 317/ AFST 317  Racial and Ethnic Relations
2. SOCI 323/ AFST 323  Sociology of African Americans
3. SOCI 403  Sociology of Latinos

Select one of the following:  

1. SOCI 316/ WGST 316  Sociology of Gender
2. SOCI 424/ WGST 424  Women and Work in Society
3. SOCI 411  Social Psychology

**Total Semester Credit Hours**  6

**Education Courses**

More complete information on requests for teacher certification may be found in the College of Education and Human Development section under secondary certification.

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDTC 345  Microcomputer Awareness for Educators</td>
<td>3</td>
</tr>
<tr>
<td>INST 210  Understanding Special Populations</td>
<td>3</td>
</tr>
<tr>
<td>COMM 203  Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>TEFB 322  Teaching and Schooling in Modern Society</td>
<td>3</td>
</tr>
<tr>
<td>TEFB 323  Teaching Skills I</td>
<td>3</td>
</tr>
<tr>
<td>TEFB 324  Teaching Skills II</td>
<td>3</td>
</tr>
<tr>
<td>TEFB 401  Language Arts in the Middle and Senior School</td>
<td>3</td>
</tr>
<tr>
<td>TEFB 404  Social Studies in the Middle and Senior High School</td>
<td>3</td>
</tr>
<tr>
<td>TEFB 406  Science in the Middle and Secondary School</td>
<td>3</td>
</tr>
<tr>
<td>TEFB 407  Mathematics in the Middle and Senior School</td>
<td>3</td>
</tr>
<tr>
<td>TEFB 426  Supervised Clinical Teaching</td>
<td>6</td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours**  36

Students should consult an undergraduate Sociology advisor as early as possible to review the requirements of the social studies composite.
Sociology - Minor

The Department of Sociology offers a minor in Sociology.

Program Requirements

Select five from the following:  

- SOCI 205 - SOCI 489 (p. 976)  

Total Semester Credit Hours  

15

Students must make a grade of "C" or better in all courses.

At least nine hours must be at the 300- or 400-level.

Latino/a and Mexican-American Studies - Minor

The Latino/a and Mexican American Studies (or LMAS) minor at Texas A&M University invites students to investigate the experiences and contributions of Latino/as in the United States and abroad. Students minorin in LMAS will receive instruction from interdisciplinary faculty across the colleges in the areas of History, Sociology, English, Anthropology, Psychology, Communications, Political Science, Health, Geography, Education, and Hispanic studies.

The courses provide students with a broad knowledge about Latinos frequently omitted from the common curriculum, centered in the experiences of Latinos, and which provides an important pathway to multiple career choices.

Topics covered in courses include race/ethnicity, gender, politics, religion, education, and labor as well as major historical events like the Chicano and Puerto Rican civil rights movements and the social and demographic changes brought on by continued immigration.

Career Options

The LMAS minor can be a critical addition to a student's career opportunities in occupations in the public or private sectors as employers desire applicants with intercultural competence.

In addition, the minor demonstrates knowledge in a growing specialty area which is attractive to graduate programs in areas including but not limited to Business Administration, Media/Journalism, History, Public Health, Psychology, and Sociology.

Program Requirements

Select at least 6 hours from the following:  

- ENGL/ HISP 362 - Borderlands: U.S. and Mexico  
- HIST 307 - Latino Communities of the U.S.  
- POLS 304 - Latino Politics in the United States  
- SOCI 403 - Sociology of Latinos  
- SPAN 412 - Hispanic Writers in the U.S.  

Total Semester Credit Hours  

6

The two courses (6 hours) from the first area must come from two departments.

Students will select 18 hours total from both lists with a minimum of 9 hours at the upper-division level (300- and 400-level).

Students must earn a C or higher in each course to be counted in the minor field.

Global Sociology - Certificate

The Certificate in Global Sociology gives students concentrated educational experience in international sociological perspectives. This certificate program is open to all Texas A&M sociology majors. The certificate indicates meritorious completion of the appropriate courses. The 12 credits needed to complete the certificate may fulfill 12 credits of Sociology major electives.

Program Requirements

Select three of the following:  

- SOCI 206 - Global Social Trends  
- SOCI 207/ WGST 207 - Introduction to Gender and Society  
- SOCI 312 - Population and Society  
- SOCI 313 - Military, War and Society  
- SOCI 322 - Industrial Sociology  
- SOCI 325/ ASIA 325 - International Business Behavior  
- SOCI 328 - Environmental Sociology  
- SOCI 329/ ASIA 329 - Pacific Rim Business Behavior  
- SOCI 330 - Sociology of Nutrition  

Total Semester Credit Hours  

9

1. The two courses (6 hours) from the first area must come from two departments.

2. Students will select 18 hours total from both lists with a minimum of 9 hours at the upper-division level (300- and 400-level).
**International Experience**

Each student must ordinarily complete one semester abroad, either through one of Texas A&M’s regular programs (such as the Santa Chiara, Italy program) or another approved study abroad program, international internship or similar academic experience in another country. With the permission of the undergraduate advisor, a student may substitute appropriate overseas work or experience. Course credit from courses taken during study abroad may sometimes count toward the three required courses in part (b), with the approval of the undergraduate advisor.

**Language**

A minimum of two years (four courses) at the college level of a non-English language is required, normally taken prior to the study abroad or other international experience. The language should be appropriate to the student’s overall program.

**Grade Point**

A cumulative GPR of 3.0 or above must be earned in courses counting toward the certificate.

Transfer courses, independent studies and credit by exam cannot substitute for the required courses unless approved by the undergraduate advisor for certificate purposes.

**Sociology of Gender - Certificate**

The Certificate in Sociology of Gender prepares students for graduate studies in gender-related issues and for work in which gender issues are important. This course of study will also help the student become a knowledgeable and responsible citizen in a society which has become increasingly committed to establishing gender equality. Students may, if they wish, combine this certificate with a minor in Women’s and Gender Studies. This certificate program is open to all Texas A&M sociology majors. The certificate indicates meritorious completion of the appropriate courses. The 12 credits needed to complete the certificate may fulfill 12 credits of Sociology major electives.

**Program Requirements**

- **SOCI 207/ WGST 207** Introduction to Gender and Society 3
- Select three of the following: 9
  - SOCI 207/ WGST 207 Introduction to Gender and Society
  - SOCI 312 Population and Society
  - SOCI 315/ WGST 315 The Marriage Institution
  - SOCI 316/ WGST 316 Sociology of Gender
- SOC 322 Industrial Sociology
- SOC 424/ WGST 424 Women and Work in Society
- SOC 484 Field Practicum 1
- SOC 489 Special Topics in... 1

**Total Semester Credit Hours** 12

1 Credit contingent on appropriateness of subject matter as determined by undergraduate advisor.

A cumulative GPR of at least 3.0 must be earned in courses counting toward the certificate.

Transfer courses, independent studies and credit by exam cannot substitute for the required courses unless approved by the undergraduate advisor for certificate purposes.

**Sociology of Race and Ethnicity - Certificate**

The Certificate in Sociology of Race and Ethnicity gives students 12 hours of intensive training in a broad range of issues related to racial diversity and ethnic dynamics. This certificate program is open to all Texas A&M sociology majors. The certificate indicates meritorious completion of the appropriate courses. The 12 credits needed to complete the certificate may fulfill 12 credits of Sociology major electives.

**Program Requirements**

- **SOCI 317/ AFST 317** Racial and Ethnic Relations 3
- Select three of the following: 9
  - SOCI 323/ AFST 323 Sociology of African Americans
  - SOCI 337 International Migration
  - SOCI 403 Sociology of Latinos
  - SOCI 419 Social Class in Contemporary Society
  - SOCI 484 Field Practicum 1
  - SOCI 489 Special Topics in... 1
- **SOCI 322** Industrial Sociology
- **SOCI 424/ WGST 424** Women and Work in Society
- **SOCI 484** Field Practicum 1
- **SOCI 489** Special Topics in... 1

**Total Semester Credit Hours** 12

1 Credit contingent on appropriateness of subject matter as determined by undergraduate advisor.

A cumulative GPR of 3.0 or above must be earned in courses counting toward the certificate.

Transfer courses, independent studies and credit by exam cannot substitute for the required courses unless approved by the undergraduate advisor for certificate purposes.

**University Studies Programs**

The College of Liberal Arts offers degrees in University Studies. A University Studies degree differs from a traditional “major” in that it consists of a concentration and two minors of 15-18 hours each. The University Studies degree format was created to provide students the flexibility to combine areas of study that are of special interest.
Majors

- Bachelor of Arts in University Studies, Journalism Concentration (p. 501)
- Bachelor of Arts in University Studies, Race, Gender, Ethnicity Concentration (p. 501)
- Bachelor of Science in University Studies, Race, Gender, Ethnicity Concentration (p. 504)

University Studies - BA, Journalism Concentration

University Studies - Journalism in the College of Liberal Arts represents an interdisciplinary approach to journalism education, with an emphasis on writing-intensive courses (four would be required as part of the concentration) and electives from other disciplines that complement and support the critical thinking skills required of journalists in the 21st century. In addition to the concentration in journalism through the University Studies degree, students in the program are required to have a minor within the College of Liberal Arts and another outside the college, substantially broadening the interdisciplinary aspects of journalism education.

Students with a degree in University Studies - Journalism would be prepared for a successful life and career in several ways. Their coursework would emphasize critical thinking skills—a necessary component in the changing world of journalism that relies on writing for different types of media with frequent updates and differing audiences. They would be exposed to experiential learning through classes that require students to report and write on deadline and by the requirement for an internship in the field. They would develop and enhance strong writing skills by taking up to four writing-intensive courses. The very nature of journalism—constantly reporting and evaluating new information while examining new topics—would prepare them to be thoughtful consumers of information and encourage them to engage in learning throughout their lifetimes.

Program Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOUR 200</td>
<td>Mass Media Information</td>
<td>3</td>
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<tr>
<td>JOUR 203</td>
<td>Media Writing I</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 250/COMM 250</td>
<td>New Media and the Independent Voice</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 484</td>
<td>Internship</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 490</td>
<td>Journalism as a Profession</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 303</td>
<td>Media Writing II</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 304</td>
<td>Editing for the Mass Media</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 450</td>
<td>Political Reporting</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 451</td>
<td>Arts &amp; Entertainment Journalism</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 455</td>
<td>Literary Nonfiction</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 485</td>
<td>Directed Studies</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 489</td>
<td>Special Topics in...</td>
<td>3</td>
</tr>
<tr>
<td>ANTH 404/WGST 404</td>
<td>Women and Culture</td>
<td>6</td>
</tr>
<tr>
<td>JOUR 291</td>
<td>Research</td>
<td>3</td>
</tr>
<tr>
<td>JOUR 491</td>
<td>Research</td>
<td>3</td>
</tr>
</tbody>
</table>

Select one of the following:

- JOUR 200
- JOUR 203
- JOUR 250/COMM 250
- JOUR 484
- JOUR 490
- JOUR 303
- JOUR 304
- JOUR 450
- JOUR 451
- JOUR 455
- JOUR 485
- JOUR 489

Select two of the following:

- ANTH 404/WGST 404
- JOUR 291
- JOUR 491

University Studies - BA, Race, Gender, Ethnicity Concentration

This area of concentration is purposefully designed to require that students complete coursework that educates them in interdisciplinary knowledge. Two inquiry-rich, research-based courses, one an introduction and one a capstone senior seminar, provide students with introductory and concluding courses in the methodologies appropriate to interdisciplinary studies in Race, Gender and Ethnicity.

Program Requirements

Select two of the following:

- AFST 201 Introduction to Africana Studies
Course approved by CLLA

400-level Capstone course meeting University Writing Requirement

Humanities elective

Select two of the following:

AFST 201 Introduction to Africana Studies
AFST 302 Gateway Course
AFST 481 Seminar
ANTH 205 Peoples and Cultures of the World
ANTH 301 Indians of North America
CLAS 330 Women in Ancient Greece and Rome
COMM Rhetoric of the Civil Rights Movement
425
COMM 431 Rhetoric of Social Movements
ENGL 204/ Introduction to African-American Literature
AFST 204
ENGL 329/ African-American Literature Pre-1930
AFST 329
ENGL 333/ Gay and Lesbian Literature
WGST 333
ENGL 338 American Ethnic Literature
ENGL 339/ African-American Literature Post-1930
AFST 339
ENGL 362/ Latino/a Literature
HISP 362
EURO 323 Immigration and Ethnicity in Contemporary France
HIST 258 American Indian History
HIST 300/ Blacks in the United States, 1607-1877
AFST 300
HIST 301/ Blacks in the United States Since 1877
AFST 301
HIST 304 Mexican-American Frontier to 1848
HIST 305 Mexican-American History 1848-Present
HIST 307 Latino Communities of the U.S.
HIST 319 U.S. Immigration and Ethnicity
HIST 330 Women in Ancient Greece and Rome
HIST 345/ Modern Africa
AFST 345
HIST 346/ History of South Africa
AFST 346
HIST 401 Slavery in World History
HIST 461/ History of American Women
WGST 461
HIST 473/ History of Modern American Women
WGST 473
HIST 476/ Sex and Sexuality in History
WGST 476
HIST 477/ Women in Modern European History
WGST 477
PERF 326 Dance and Identity in the United States
SPAN 412 Hispanic Writers in the U.S.
WGST 330 Women in Ancient Greece and Rome
WGST 391 Studies in Gender and Diversity

Humanities/Social sciences elective

Select two of the following:

ANTH 404/ Women and Culture
WGST 404
ANTH 427 Human Variation
COMM 335 Intercultural Communication
COMM Women, Minorities and the Mass Media
407/WGST 407
COMM Gender and Communication
420/WGST 420
POLS 304 Latino Politics in the United States
POLS 317/ Women in Politics
WGST 317
POLS 320 Race and Politics in the United States
POLS 462/ Women and the Law
WGST 462
PSYC 300/ Psychology of Women
WGST 300
SOCI 207/ Introduction to Gender and Society
WGST 207
SOCI 317/ Racial and Ethnic Relations
WGST 317
SOCI 323/ Sociology of African Americans
AFST 323
SOCI 403 Sociology of Latinos
SOCI 424/ Women and Work in Society
WGST 424
WGST 207/SOCI 207
WGST 300/PSYC 300
WGST 317/POLS 317
WGST 404/ANTH 404
WGST Women, Minorities and the Mass Media
407/COMM 407
WGST Gender and Communication
420/COMM 420
WGST Women and Work in Society
424/SOCI 424

Social science elective

Select two of the following:

AFST 201 Introduction to Africana Studies
AFST 302 Gateway Course
AFST 481 Seminar
ANTH 205 Peoples and Cultures of the World
ANTH 301 Indians of North America
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANTH 404</td>
<td>Women and Culture</td>
</tr>
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<td>WGST 404</td>
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</tr>
<tr>
<td>ANTH 427</td>
<td>Human Variation</td>
</tr>
<tr>
<td>CLAS 330</td>
<td>Women in Ancient Greece and Rome</td>
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<td>COMM 335</td>
<td>Intercultural Communication</td>
</tr>
<tr>
<td>COMM 407/WGST 407</td>
<td>Women, Minorities and the Mass Media</td>
</tr>
<tr>
<td>COMM 420/WGST 420</td>
<td>Gender and Communication</td>
</tr>
<tr>
<td>COMM 425/AFST 425</td>
<td>Rhetoric of the Civil Rights Movement</td>
</tr>
<tr>
<td>COMM 431</td>
<td>Rhetoric of Social Movements</td>
</tr>
<tr>
<td>ENGL 204/AFST 204</td>
<td>Introduction to African-American Literature</td>
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<tr>
<td>ENGL 329/AFST 329</td>
<td>African-American Literature Pre-1930</td>
</tr>
<tr>
<td>ENGL 333/WGST 333</td>
<td>Gay and Lesbian Literature</td>
</tr>
<tr>
<td>ENGL 338/WGST 338</td>
<td>American Ethnic Literature</td>
</tr>
<tr>
<td>ENGL 339/AFST 339</td>
<td>African-American Literature Post-1930</td>
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<td>ENGL 362/HISP 362</td>
<td>Latino/a Literature</td>
</tr>
<tr>
<td>EURO 323</td>
<td>Immigration and Ethnicity in Contemporary France</td>
</tr>
<tr>
<td>HIST 258</td>
<td>American Indian History</td>
</tr>
<tr>
<td>HIST 300/AFST 300</td>
<td>Blacks in the United States, 1607-1877</td>
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<td>HIST 301/AFST 301</td>
<td>Blacks in the United States Since 1877</td>
</tr>
<tr>
<td>HIST 304</td>
<td>Mexican-American Frontier to 1848</td>
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<td>HIST 305</td>
<td>Mexican-American History 1848-Present</td>
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<td>HIST 307</td>
<td>Latino Communities of the U.S.</td>
</tr>
<tr>
<td>HIST 319</td>
<td>U.S. Immigration and Ethnicity</td>
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<td>HIST 330</td>
<td>Women in Ancient Greece and Rome</td>
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<td>HIST 345/AFST 345</td>
<td>Modern Africa</td>
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<td>HIST 346/AFST 346</td>
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**University and College Requirements**

- Communication (p. 20) 6
- Mathematics (p. 20) 6
- Life and physical sciences (p. 20) 9
- Language, philosophy and culture (p. 21) 3
- Creative arts (p. 22) 3
- Social and behavioral sciences (p. 23) 3
- American history (p. 23) 1 6
- Political science 2 6
- POLS 206 American National Government
- POLS 207 State and Local Government
- Foreign language (p. 405) 6
General Electives 3 12-18
Minor 1 15-18
Minor 2 15-18
Total Semester Credit Hours 120

1 Two American History courses or one American History course and one Texas History course will fulfill this requirement.
2 One course on federal government and one course on state/local government will fulfill this requirement. Completing four semesters of upper-level ROTC may be substituted for 3 semester hours of the six hours required.
3 100-499 courses not used elsewhere.

University Studies - BS, Race, Gender, Ethnicity Concentration

This area of concentration is purposefully designed to require that students complete coursework that educates them in interdisciplinary knowledge. Two inquiry-rich, research-based courses, one an introduction and one a capstone senior seminar, provide students with introductory and concluding courses in the methodologies appropriate to interdisciplinary studies in Race, Gender and Ethnicity.

Program Requirements

Select two of the following: 6
- AFST 201 Introduction to Africana Studies
- Courses approved by CLLA
- 400-level Capstone course meeting University Writing Requirement
- Language, philosophy and culture elective

Select two of the following: 6
- AFST 201 Introduction to Africana Studies
- AFST 302 Gateway Course
- AFST 481 Seminar
- ANTH 205 Peoples and Cultures of the World
- ANTH 301 Indians of North America
- CLAS 330 Women in Ancient Greece and Rome
- COMM Rhetoric of the Civil Rights Movement
- 425/AFST 425
- COMM 431 Rhetoric of Social Movements
- ENGL 204/ Introduction to African-American Literature
- AFST 204
- ENGL 329/ African-American Literature Pre-1930
- AFST 329
- ENGL 333/ Gay and Lesbian Literature
- WGST 333
- ENGL 338 American Ethnic Literature
- ENGL 339/ African-American Literature Post-1930
- AFST 339
- ENGL 362/ Latino/a Literature
- HISP 362
- EURO 323 Immigration and Ethnicity in Contemporary France
- HIST 258 American Indian History
- HIST 300/ Blacks in the United States, 1607-1877
- AFST 300
- HIST 301/ Blacks in the United States Since 1877
- AFST 301
- HIST 304 Mexican-American Frontier to 1848
- HIST 305 Mexican-American History 1848-Present
- HIST 307 Latino Communities of the U.S.
- HIST 319 U.S. Immigration and Ethnicity
- HIST 330 Women in Ancient Greece and Rome
- HIST 345/ Modern Africa
- AFST 345
- HIST 346/ History of South Africa
- AFST 346
- HIST 401 Slavery in World History
- HIST 461/ History of American Women
- WGST 461
- HIST 473/ History of Modern African Women
- WGST 473
- HIST 476/ Sex and Sexuality in History
- WGST 476
- HIST 477/ Women in Modern European History
- WGST 477
- PERF 326 Dance and Identity in the United States
- SPAN 412 Hispanic Writers in the U.S.
- WGST 330 Women in Ancient Greece and Rome
- WGST 391 Studies in Gender and Diversity
- Social and behavioral science elective
- Select two of the following: 6
- ANTH 404/ Women and Culture
- WGST 404
- ANTH 427 Human Variation
- COMM 335 Intercultural Communication
- COMM Women, Minorities and the Mass Media
- 407/WGST 407
- COMM Gender and Communication
- 420/WGST 420
- POLS 304 Latino Politics in the United States
- POLS 317/ Women in Politics
- WGST 317
- POLS 320 Race and Politics in the United States
- POLS 462/ Women and the Law
- WGST 462
- PSYC 300/ Psychology of Women
- WGST 300
- SOCI 207/ Introduction to Gender and Society
- WGST 207
- SOCI 317/ Racial and Ethnic Relations
- AFST 317
- SOCI 323/ Sociology of African Americans
- AFST 323
- SOCI 403 Sociology of Latinos
- SOCI 424/ Women and Work in Society
- WGST 424
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WGST  Women and Work in Society
424

WGST  Women and the Law
462

WGST  Women in Modern European History
477

University and College Requirements
Select two from the following: 6

ATMO 100 - ATMO 499 (p. 644)
BIOL 100 - BIOL 499 (p. 660)
CHEM 100 - CHEM 499 (p. 675)
CSCE 100 - CSCE 499 (p. 698)
GEOL 100 - GEOL 499 (p. 802)
GEOP 100 - GEOP 499 (p. 806)
MATH 131 - MATH 499 (p. 860)
OCNG 100 - OCNG 499 (p. 916)
PHYS 100 - PHYS 499 (p. 934)
STAT 201 - STAT 499 (p. 990)

Communication (p. 20) 6
Mathematics (p. 20) 6
Life and physical sciences (p. 20) 9
Language, philosophy and culture (p. 21) 3
Creative arts (p. 22) 3
Social and behavioral sciences (p. 23) 3
American history (p. 23) 6

Government/political science 2 6

POLS 206  American National Government
POLS 207  State and Local Government

General Electives 3 12-18
Minor 1 15-18
Minor 2 15-18

Total Semester Credit Hours 120

1  Two American History courses or one American History course and one Texas History course will fulfill this requirement.

2  One course on federal government and one course on state/local government will fulfill this requirement. Completing four semesters of upper-level ROTC may be substituted for 3 semester hours of the six hours required.

3  100-499 courses not used elsewhere.
General Statement

Registered nurses have been called the backbone of our health care system. Working on the front lines of health care, they treat patients, monitor and record their condition, help establish a plan of care, educate patients or the public about a health condition, and provide advice and emotional support to patients’ family members. Registered nurses are highly observant and detail-oriented and are often the first to catch important and changing signs and symptoms. They are increasingly being recognized as leaders in transforming the health care system to meet the burgeoning demand for prevention, wellness and primary care services with a focus on improving quality and managing costs. In addition to their clinical expertise, nurses are being sought out to serve in a variety of leadership posts on bodies developing policy recommendations related to a wide-range of health care policy issues.

Individuals who earn a nursing degree must first complete a national licensing examination in order to obtain a nursing license. Further training or education can qualify nurses to work in specialty areas, such as emergency care, pediatrics, labor and delivery, psychiatry, oncology, surgery or public health. Graduate education can increase advancement opportunities for nurses including administrative positions, academic faculty positions, and as nurse practitioners.

The College of Nursing is committed to addressing the critical nursing shortage across Texas through exceptional educational programs in nursing. Our students are provided with cutting-edge classroom technologies and simulated experiences, which include standardized patients and virtual clinical learning activities. As leaders, our graduates are taught to question traditional methods and continually seek the best practices based on relevant clinical research. Through community service and leadership opportunities, the College of Nursing fosters a sense of social responsibility and global citizenship.

History

After receiving approval in 2008 from the Texas Board of Nursing, the College of Nursing located in Bryan-College Station, Texas, was created. Initially, 44 students were admitted expected to assist upon graduation with the severe nursing shortage across Texas. With a nursing workforce shortage and a large population that is aging and ready to retire, it is vital to the state of Texas to help increase the number of baccalaureate-prepared registered nurses. The college is committed to addressing this need. The faculty and staff believe that highly skilled nurses, working in collaboration with other health professionals, through research and service can enable individuals, families and groups to achieve a maximum state of well-being.

College of Nursing Programs

Program: Baccalaureate degree in nursing
Length: 12 to 22 months
General Admissions Requirements: Prerequisite coursework varies by program
Application Deadline: Varies depending on program of study
Start Term: Varies depending on program of study
Specialization, Program of Study: BSN Traditional Track, BSN Second Degree Track, RN to BSN Track, Select BSN Track
Degree: BSN.

Baccalaureate Degree in Nursing

The College of Nursing offers four tracks that lead to a Bachelor of Science in Nursing (BSN) degree. Upon obtaining the BSN degree, the graduate will apply to take the registered nurse (RN) licensure examination. Students are admitted into the program one time a year based on track.

Accreditation by the Commission on Collegiate Nursing Education (CCNE)

The Commission on Collegiate Nursing Education is an autonomous accrediting agency, contributing to the improvement of the public’s health. A specialized/professional accrediting agency, CCNE ensures the quality and integrity of baccalaureate and graduate nursing programs and of post-baccalaureate nurse residency programs. The Commission on Collegiate Nursing Education gave a full ten year accreditation to the College of Nursing in 2014 for the B.S.N. program and recently competed a review for the new M.S.N-ED program. The full report on that review will be available in November, 2015. For more information on accreditation, go to www.aacn.nche.edu/ccne-accreditation (http://www.aacn.nche.edu/ccne-accreditation).

Good Academic Standing

Good academic standing is defined as having a minimum grade point average of 2.0 (on a 4.0 scale), maintaining a minimum grade of C in all courses, and not being on probation for any reason. Students must be in good academic standing in order to progress in the program. If a student receives a grade of D or F in any course in any given semester, the student will automatically be placed on probation and notified in writing of probation status. The student will remain on probation until the course is repeated with a C or better. The course can only be taken through the College of Nursing. Students are not permitted to repeat more than one course during their enrollment in the program.

Students must complete the program in three consecutive years. If a student repeats a course, which he/she has failed in the College of Nursing, the official grade is the last one earned. That official grade will be used in computing the grade point average and the failing grade will remain on the record.

Academic Dismissal

Students will not be permitted to continue in the nursing program or apply for readmission if they:
1. receive a grade of D or F in more than one course,
2. receive any combination of grades of D or F on two attempts of the same course, or
3. receive notice of dismissal from the program by the Associate Dean for Academic Affairs or the Associate Dean for Student Affairs for failure to adhere to College of Nursing policy.

**Nursing Professional Code of Ethics**

Students in nursing and other health professions curricula are held to standards of conduct that both differ from and exceed those usually expected of university students. Each student enrolled in the College of Nursing is expected to uphold the professional code of ethics established for and by the nursing profession. The nurse recognizes that his/her first obligation is to the patient’s welfare.

Any situation that threatens patient safety, exhibits a lack of moral character, demonstrates a lack of professionalism or good judgment, and/or proves harmful to the hospital or college environment is a violation of College/Hospital policy and may result in immediate termination from the program.

**Compliance Requirements for Clinical Courses**

Students must provide documentation confirming completion of compliance requirements prior to participating in clinical nursing courses. Information on requirements is provided upon admission and during New Student Orientation.

**Location**

The College of Nursing educates students at three campus locations: Bryan/College Station, Round Rock, and McAllen, Texas. The Bryan/College Station campus opened in 2010 and serves as the headquarters of the Texas A&M Health Science Center College of Nursing. The 200-acre campus is located along State Highway 47 approximately three miles west of the main campus of Texas A&M University. In 2009, the College of Nursing opened a new facility in Round Rock providing a state-of-the-art 134,000-square-foot structure with classrooms, a simulation center, library, study lounge, student services and faculty offices. The McAllen campus was established in 2000 and provides comprehensive, accessible health education programs and services to residents of the Lower Rio Grande Valley of Texas. Since 2014, the College of Nursing has provided prospective and current student support. The McAllen campus is housed in a 23,000-square-foot facility with space for laboratories, offices, classrooms and conference areas available to deliver a wide range of health training, clinical research, medical education, community interventions and public health programs with local partners.

Bryan/College Station Campus
8447 State Highway 47
Bryan, TX 77807-3260
(979) 436-0110
nursing.tamhsc.edu (http://nursing.tamhsc.edu)

Round Rock Campus
3950 North A. W. Grimes Blvd.
Round Rock, TX 78665
(512) 341-4200

McAllen Campus
2101 South McColl Road
McAllen, TX 78503 (956) 668-6328

**Faculty**

Gosselin, Kevin, Assistant Dean for Research and Evidence Based Practice
College of Nursing
PhD, Texas Tech University, 2009

Gruben, Darla, Clinical Assistant Professor
College of Nursing
MS, University of Texas Health Science Center, San Antonio, 1999

Hinze, Maxine, Assistant Professor
College of Nursing
PhD, University of Texas at Austin, 1988

Jarrell, Lynda, Clinical Assistant Professor
College of Nursing
DNP, American Sentinel University, 2014

**Majors**

**College of Nursing**

- Bachelor of Science in Nursing, Traditional BSN (p. 508)
- Bachelor of Science in Nursing, Second Degree BSN Track (p. 509)
- Bachelor of Science in Nursing, Select BSN Track (p. 510)
- Bachelor of Science in Nursing, RN to BSN Track (p. 511)

**Masters**

**College of Nursing**

- Master of Science in Nursing in Family Nurse Practitioner (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/nursing/msn-family-practitioner)
- Master of Science in Nursing in Nursing Education (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/nursing/msn)

**Nursing - BS, Traditional BSN**

The traditional track requires the successful completion of prerequisite coursework prior to beginning upper division courses. College counselors will be able to advise students regarding equivalencies to common course numbers. Information is also available regarding courses at www.tccns.org (http://www.tccns.org) and through the Texas A&M Transfer Course Equivalency (https://compass-ssb.tamu.edu/pls/PROD/bwxkwtes.P_TransEquivMain) web page.

**Upper Level Entry to the Traditional Bachelor of Science in Nursing**

**Internal Transfer Applicants**

An Internal Transfer Applicant is a current Texas A&M University undergraduate in a non-nursing major who meets specific requirements to apply to the upper division sequence in Nursing. Meeting requirements does not guarantee admission, it only allows a student the opportunity to apply for a seat.
Students must submit the application available on the CON website no later than February 1 in the year they are applying. Note: All academic information included on the application must be posted to and appear in a student's official record at Texas A&M.

External Transfer Applicants

A limited number of External Transfer Applicants from colleges and universities outside of Texas A&M University will be admitted.

Due to enrollment constraints, admission into the program is extremely competitive with a limited number of spaces available each year. Applicants must have all prerequisite courses completed by the first class day.

Admission to the College of Nursing upper-level entry program is competitive. The student must have a minimum grade of C in each prerequisite course and meet the recommended minimum cumulative grade point average of at least 3.0 on a 4.0 scale. Students admitted to the program usually exceed this minimum requirement significantly, with higher grade point averages in all university courses, in core curriculum courses and in the science courses. Preference is given to students completing more than 50% of coursework in either Brazos or Williamson counties in the state of Texas. In addition, applicants are required to complete the HESI Admissions Assessment A2 exam within one year of the application deadline. Students may take the exam only one time per application cycle. The application includes the application, HESI score, personal statement, a transcript from every other college or university the student has attended and a high school transcript. Admission decisions are based on:

1. the strength of the student’s academic background;
2. HESI A2 score;
3. the personal statement;
4. the student’s achievements and accomplishments, with emphasis on volunteer work and activities in health care;
5. minimal academic history of repeats, withdraws or failures; and
6. the personal interview

Program Requirements

Prerequisite Courses

Prerequisites may be planned or in progress during the application cycle, but must be completed with a grade of “C” or better before the program start date. The courses may be completed at any regionally accredited college or university.

Communication

English Comp I- 3 credit hours
English Comp II: Course that meets TAMU or sending institution core curriculum- 3 credit hours

American History/Government/Social and Behavioral Science

History- 6 credit hours
Political Science (federal or Texas)- 6 credit hours
Psychology- 3 credit hours
Life Span Growth and Development Psychology- 3 credit hours

Mathematics

Two courses selected from core curriculum- 6 credit hours

Life and Physical Sciences

Introductory Biology- 4 credit hours
Anatomy & Physiology I and II- 8 credit hours
Introductory or General Chemistry- 4 credit hours
Microbiology- 4 credit hours
Nutrition- 3 credit hours

Other Courses

Language, Philosophy and Culture: Philosophy (Intro or Ethics)- 3 credit hours
Creative Arts: Course that meets TAMU or sending institution core curriculum

Foreign Language

Proficiency in a foreign language is required. Can be met by taking two years of the same language in high school or college credit.

Students transferring from another Texas public college or university may be able to use Statistics (MATH 1342 or 1442) to meet the core math requirement as long as that course meets the transferring institution's core.

TAMU students must meet 9 hour science core requirement. KINE 120 may be required.

NURS 301 Nursing Foundation 2
NURS 305 Nursing Dimensions and Informatics 3
NURS 312 Introduction to Pathophysiology 3
NURS 313 Nursing Fundamentals 5
NURS 314 Health Assessment 3
NURS 315 Nursing and the Aged 3
NURS 316 Pharmacology Principles 3
NURS 320 Adult Nursing I 6
NURS 323 Nursing Care of Women, Families and Newborns 4
NURS 405 Selected Topics in Nursing 1
NURS 411 Evidence-Based Practice for Nurses 3
NURS 412 Care of Mental Health Clients 4
NURS 413 Nursing Care of Children and Families 4
NURS 420 Adult Nursing II 6
NURS 421 Care of Community Health Clients 5
NURS 424 Professional Issues 2
NURS 430 Transition to Professional Nursing Practice 5

Total Semester Credit Hours

62

Nursing - BS, Second Degree BSN Track

The second degree (post baccalaureate) track is for students who already hold a bachelor’s degree in another field of study. Acceptance into this track requires successful completion of prerequisite coursework prior to
beginning upper division courses. All students will be required to complete core curriculum requirements if these were not met in the previous degree program. Contact the Office of Student Affairs for more information.

Students with a previous bachelor’s degree may apply to the traditional BSN track and must follow the same requirements as noted above. If they met a core curriculum at another Texas institution in their previous degree, it will be accepted for entry into the College of Nursing.

Upper Level Entry to the Second Degree Bachelor of Science in Nursing

Internal Transfer Applicants

An Internal Transfer Applicant is a current Texas A&M University undergraduate in a non-nursing major who meets specific requirements to apply to the upper division sequence in Nursing. Meeting requirements does not guarantee admission, it only allows a student the opportunity to apply for a seat.

Students must submit the application available on the CON website no later than February 1 in the year they are applying. Note: All academic information included on the application must be posted to and appear in a student’s official record at Texas A&M.

External Transfer Applicants

A limited number of External Transfer Applicants from colleges and universities outside of Texas A&M University will be admitted.

Due to enrollment constraints, admission into the program is extremely competitive with a limited number of spaces available each year. Applicants must have all prerequisite courses completed by the first class day.

Admission to the College of Nursing upper-level entry program is competitive. The student must have a minimum grade of C in each prerequisite course and a recommended minimum cumulative grade point average of at least 3.0 (on a 4.0 scale). Students admitted to the program usually exceed this minimum requirement significantly, with higher grade point averages in all university courses, in core curriculum courses and in the science courses. Preference is given to students completing more than 50% of coursework in either Brazos or Williamson counties in the state of Texas. In addition, applicants must complete the HESI Admissions Assessment A2 exam within one year of the application deadline. Students may take the exam only one time per application cycle. The application includes the application, HESI score, personal statement, a transcript from every other college or university the student has attended and a high school transcript. Admission decisions are based on:

1. the strength of the student’s academic background;
2. HESI A2 score;
3. the personal statement;
4. the student’s achievements and accomplishments, with emphasis on volunteer work and activities in health care;
5. minimal academic history of repeats, withdraws or failures; and
6. the personal interview

Program Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS 301</td>
<td>Nursing Foundation</td>
<td>2</td>
</tr>
<tr>
<td>NURS 305</td>
<td>Nursing Dimensions and Informatics</td>
<td>3</td>
</tr>
<tr>
<td>NURS 312</td>
<td>Introduction to Pathophysiology</td>
<td>3</td>
</tr>
<tr>
<td>NURS 313</td>
<td>Nursing Fundamentals</td>
<td>5</td>
</tr>
<tr>
<td>NURS 314</td>
<td>Health Assessment</td>
<td>3</td>
</tr>
<tr>
<td>NURS 315</td>
<td>Nursing and the Aged</td>
<td>3</td>
</tr>
<tr>
<td>NURS 316</td>
<td>Pharmacology Principles</td>
<td>3</td>
</tr>
<tr>
<td>NURS 320</td>
<td>Adult Nursing I</td>
<td>6</td>
</tr>
<tr>
<td>NURS 323</td>
<td>Nursing Care of Women, Families and Newborns</td>
<td>4</td>
</tr>
<tr>
<td>NURS 405</td>
<td>Selected Topics in Nursing</td>
<td>1</td>
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<tr>
<td>NURS 411</td>
<td>Evidence-Based Practice for Nurses</td>
<td>3</td>
</tr>
<tr>
<td>NURS 412</td>
<td>Care of Mental Health Clients</td>
<td>4</td>
</tr>
<tr>
<td>NURS 413</td>
<td>Nursing Care of Children and Families</td>
<td>4</td>
</tr>
<tr>
<td>NURS 420</td>
<td>Adult Nursing II</td>
<td>6</td>
</tr>
<tr>
<td>NURS 421</td>
<td>Care of Community Health Clients</td>
<td>5</td>
</tr>
<tr>
<td>NURS 424</td>
<td>Professional Issues</td>
<td>2</td>
</tr>
<tr>
<td>NURS 430</td>
<td>Transition to Professional Nursing Practice</td>
<td>5</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 62

Nursing - BS, Select BSN Track

The Select BSN allows nursing students, with or without a first degree, to obtain nursing degrees more quickly. The Select Track Bachelor of Science in Nursing (BSN) will allow bachelor’s students to participate in a “fast track” program to complete both a BSN and a Master of Science in Nursing (MSN) within a three-year academic trajectory. Students must complete prerequisite coursework prior to entry. Because of the rigorous nature of the Select Track program, it will only be offered in full-time course loads.

Upper Level Entry to the Select Bachelor of Science in Nursing

Internal Transfer Applicants

An Internal Transfer Applicant is a current Texas A&M University undergraduate in a non-nursing major who meets specific requirements to apply to the upper division sequence in Nursing. Meeting requirements does not guarantee admission, it only allows a student the opportunity to apply for a seat.

Students must submit the application available on the CON website no later than February 1 in the year they are applying. Note: All academic information included on the application must be posted to and appear in a student’s official record at Texas A&M.

External Transfer Applicants

A limited number of External Transfer Applicants from colleges and universities outside of Texas A&M University will be admitted.

Due to enrollment constraints, admission into the program is extremely competitive with a limited number of spaces available each year. Applicants must have all prerequisite courses completed by the first class day.

Admission to the College of Nursing upper-level entry program is competitive. The student must have a minimum grade of C in each prerequisite course and a recommended minimum cumulative grade point average of at least 3.0 (on a 4.0 scale). Students admitted to the program usually exceed this minimum requirement significantly, with higher grade point averages in all university courses, in core curriculum courses and in the science courses. Preference is given to students completing more
than 50% of coursework in either Brazos or Williamson counties in the state of Texas. In addition, applicants are required to complete the HESI Admissions Assessment A2 exam within one year of the application deadline. Students may take the exam only one time per application cycle. The application includes the application, HESI score, personal statement, a transcript from every other college or university the student has attended and a high school transcript. Admission decisions are based on:

1. the strength of the student’s academic background;
2. HESI A2 score;
3. the personal statement;
4. the student’s achievements and accomplishments, with emphasis on volunteer work and activities in health care;
5. minimal academic history of repeats, withdraws or failures; and
6. the personal interview

**Nursing - BS, RN to BSN Track**

The RN to BSN track is an opportunity for registered nurses who hold an associate’s degree in nursing and an active RN license to pursue a Bachelor of Science in Nursing degree. Students may complete the 30 credit hour upper division course of study as either a full-time or a part-time student. The RN to BSN plan allows working nurses to balance career, education and other responsibilities. All applicants are required to complete prerequisite credit hours as noted above along with any outstanding core curriculum courses in order to receive the bachelor’s degree.

**Entry to the RN to BSN (Bachelor of Science in Nursing) Program**

Those who are already a registered nurse with an associate’s degree may apply for the RN to BSN program to obtain a bachelor’s degree. All applicants are expected to complete prerequisite coursework prior to entry. The course instruction is delivered online allowing students to balance career, family and other responsibilities along with advancing their education. Students may choose to complete the curriculum in 3 semesters (1-year option), in 4 semesters (1 1/2-year option) or in 5 semesters (2-year option). Applicants who completed their Associate Degree in Nursing through an LVN to RN or Paramedic to RN bridge program must have earned a minimum of 35 transferable credits in their program in order to apply.

**Program Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>NURS 460</td>
<td>Nursing Dimensions and Informatics for the RN</td>
<td>3</td>
</tr>
<tr>
<td>NURS 461</td>
<td>Application of Evidence Based Practice for the RN</td>
<td>3</td>
</tr>
<tr>
<td>NURS 462</td>
<td>Pathophysiology and Pharmacology for the RN</td>
<td>4</td>
</tr>
<tr>
<td>NURS 463</td>
<td>Health Assessment for the RN</td>
<td>3</td>
</tr>
<tr>
<td>NURS 464</td>
<td>Health Promotion Across the Lifespan for the RN</td>
<td>3</td>
</tr>
<tr>
<td>NURS 465</td>
<td>Care of the Older Adult for the RN</td>
<td>2</td>
</tr>
<tr>
<td>NURS 466</td>
<td>Community Health for the RN</td>
<td>5</td>
</tr>
<tr>
<td>NURS 467</td>
<td>Leadership and Management for the RN</td>
<td>5</td>
</tr>
<tr>
<td>NURS 468</td>
<td>Professional Practice Issues for the RN</td>
<td>2</td>
</tr>
</tbody>
</table>

**Total Semester Credit Hours** 30
School of Public Health

Administrative Officers

Dean - Jay Maddock, Ph.D., FAAHB
Senior Associate Dean for Academic Affairs - Antonio A. Rene, Ph.D.
Associate Dean for Research - Marcia Ory, Ph.D., MPH
Assistant Dean for Student Affairs - Kyle D. Foster, B.A.
Assistant Dean for Finance and Administration - John Zamora, C.P.A., B.B.A.

General Statement

Founded in 1998 as the first public health school in the nation with a focus on rural and underserved communities, the School of Public Health developed into a nationally ranked, fully accredited public health research, service and training program. After only nine years, U.S. News & World Report ranked the school as a Top 25 Graduate School in Public Health.

Offering classes at the College Station campus as well as other Texas locations through distance education, the school provides public health bachelor’s, master’s and doctoral programs in several public health disciplines: epidemiology, biostatistics, environmental health, occupational health, occupational safety and health, health administration, policy and management, and health promotion and community health sciences. In addition to core public health curriculum, the school is home to several centers of research excellence.

Providing a forum for future public health leaders, the school builds an array of research strengths and practice skills for rural and urban settings.

History

The School of Public Health is the first of its kind in the nation. The Texas Legislature established the school in 1995 as part of a rural health initiative to better address rural health needs in the state. After receiving degree-granting authority for the Master of Public Health degree in April 1998 from the Texas Higher Education Coordinating Board, the School of Rural Public Health welcomed its inaugural class in September 1998.

In 2014, the School of Public Health welcomed its first students into the brand-new Bachelor of Science in Public Health program, the first program of its kind in the state affiliated with a fully accredited School of Public Health. With a mission to serve the public health needs of the entire state, the undergraduate program is based on a philosophy of health promotion and disease prevention to improve the quality of life of individuals, families, and communities in the State of Texas and beyond. Graduates of the BSPH program will be able to assess factors influencing health in populations as well as plan, design, implement and successfully manage effective healthcare programs and interventions as well as be well-positioned for careers in medicine, nursing and other allied health professions.

The school currently offers one bachelor’s degree program, three master’s degree programs, and two doctoral degree programs.

Location

The School of Public Health’s administration and faculty are located in a state-of-the-art, three-building complex in College Station, on the Texas A&M University west campus. The nearly 100,000-square-foot complex includes classrooms fully equipped with videoconferencing technology to support the school’s innovative distance education programs that reach across the breadth of the state. The laboratory building provides a venue for the school’s internationally regarded toxicology group to engage in exemplary public health work and provides a vehicle for training tomorrow’s researchers. The administration building houses the administration and faculty. In addition, the school operates on-going regional instructional and research programs at the McAllen campus.

School of Public Health
163 SRPH Administration Building Adriance Road
College Station, TX 77843-1266
(979) 436-9463
BSPH@tamhsc.edu
http://sph.tamhsc.edu/phs/

Majors

Department of Public Health Studies

• Bachelor of Science of Public Health (p. 513)

Masters

School of Public Health

• Master of Science in Public Health in Biostatistics (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/public-health/interdepartmental/biostatistics-msph)
• Master of Science in Public Health in Epidemiology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/public-health/interdepartmental/epidemiology-msph)
• Master of Science in Public Health in Environmental Health (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/public-health/interdepartmental/environmental-health-msph)
• Master of Science in Public Health in Health Policy and Management (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/public-health/interdepartmental/health-policy-management-msph)
• Master of Public Health in Occupational Safety and Health (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/public-health/interdepartmental/occupational-safety-health-mph)

Department of Epidemiology and Biostatistics

• Master of Public Health in Biostatistics (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/public-health/epidemiology-biostatistics/biostatistics-msph)
• Master of Public Health in Epidemiology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/public-health/epidemiology-biostatistics/epidemiology-msph)
Our mission guides us toward improving population health throughout Texas and beyond by providing competency-based educational programs focused on the knowledge, skills, and abilities relevant to the practice of public health.

Our educational programs are strengthened by our commitment to regionally focused, practice-based scholarship and service.

Our vision is simple: Texas A&M Department of Public Health Studies graduates will be world renowned for their competency as public health practitioners and as the preferred “new hires” of health organizations!

We invite you to join our family of faculty, staff and students on our collective journey for improving population health.

Faculty

Appiah, Bernard, Instructional Assistant Professor
School of Public Health
DrPH, Texas A&M University, 2013

Kodatt, Stephanie, Assistant Professor
School of Public Health
PhD, Lady of the Lakue University, 2007

Ramirez, Gilbert, Professor
School of Public Health
DrPH, University of Texas Health Science Center at Houston, 1986

Ross, Jennifer A, Instructional Assistant Professor
School of Public Health
DrPH, Texas A&M University, 2013

Majors

• Bachelor of Science of Public Health (p. 513)

Public Health - BS

Public Health professionals with a Bachelor of Science of Public Health (BSPH) are prepared to:

• assess factors influencing health in individuals, communities and populations
• plan effective programs and interventions
• design evaluations for those interventions
• successfully manage the implementation of those programs

The BSPH program is based on a philosophy of health promotion and disease prevention, to improve the quality of life of individuals, families and communities. The BSPH discipline focuses on four areas:

1. the multiple determinants of health, including biological, environmental, sociocultural, health service, and economic factors,
2. identification of scientific data, tools of informatics, and other information for identifying indicators of health status and health disparities and assessing the well-being of a community,
3. addressing major local, national, and global health challenges, and
4. designing public health approaches and interventions that improve health outcomes, population health and well-being.

The Bachelor of Science in Public Health degree program is more than a means to produce ready public health practitioners. It can complement or enrich a traditional biology-based pre-health degree plan for students intending professional education in medicine, nursing, allied health or other health professions. Notably the program establishes a specific entry-level baccalaureate degree in the Public Health academic pathway which, until recently, had started with a master’s degree.

Program Requirements
## First Year
### Fall
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
<td>4</td>
</tr>
<tr>
<td>Communication (p. 20)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Mathematics (p. 20)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Social and Behavioral Sciences (p. 23)</td>
<td></td>
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</table>

**Term Semester Credit Hours**: 13

### Spring
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BIOL 112</td>
<td>Introductory Biology II</td>
<td>4</td>
</tr>
<tr>
<td>Communication (p. 20)</td>
<td></td>
<td>3</td>
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<tr>
<td>Mathematics (p. 20)</td>
<td></td>
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<tr>
<td>Creative arts (p. 22)</td>
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**Term Semester Credit Hours**: 13

### Second Year
### Fall
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
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<tr>
<td>American history (p. 23)</td>
<td></td>
<td>3</td>
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<tr>
<td>Free Electives</td>
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**Term Semester Credit Hours**: 16

### Spring
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<tbody>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
</tr>
<tr>
<td>Language, philosophy and culture (p. 21)</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>American history (p. 23)</td>
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<td>3</td>
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<tr>
<td>Free Electives</td>
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</table>

**Term Semester Credit Hours**: 15

### Third Year
### Fall
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>PHLT 302</td>
<td>Foundations of Public Health</td>
<td>3</td>
</tr>
<tr>
<td>PHLT 303</td>
<td>Social Context of Population Health</td>
<td>3</td>
</tr>
<tr>
<td>PHLT 304</td>
<td>Biological Basis of Public Health</td>
<td>3</td>
</tr>
<tr>
<td>PHLT 310</td>
<td>Public Health Writing</td>
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</tr>
<tr>
<td>PHLT 313</td>
<td>Health Care and Public Health System</td>
<td>3</td>
</tr>
<tr>
<td>PHLT 314</td>
<td>Public Health Data Management and Assessment I</td>
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</tr>
</tbody>
</table>

**Term Semester Credit Hours**: 15

### Spring
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHLT 305</td>
<td>Epidemiology in Public Health</td>
<td>3</td>
</tr>
<tr>
<td>PHLT 309</td>
<td>Population Health Promotion</td>
<td>3</td>
</tr>
<tr>
<td>PHLT 311</td>
<td>Narrative Approach to Public Health</td>
<td>1</td>
</tr>
<tr>
<td>PHLT 330</td>
<td>The Environment and Public Health</td>
<td>3</td>
</tr>
<tr>
<td>PHLT 412</td>
<td>Health Advocacy and Policy</td>
<td>3</td>
</tr>
<tr>
<td>PHLT 315</td>
<td>Public Health Data Management and Assessment II</td>
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</tr>
</tbody>
</table>

**Term Semester Credit Hours**: 15

### Fourth Year
### Fall
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>PHLT 410</td>
<td>Public Health Communication</td>
<td>3</td>
</tr>
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</table>

**Term Semester Credit Hours**: 15

### Spring
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHLT 307</td>
<td>Public Health in the Global Context</td>
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<tr>
<td>PHLT 415</td>
<td>Emergency Management in Public Health</td>
<td>3</td>
</tr>
<tr>
<td>PHLT 445</td>
<td>Population Health Culminating Experience</td>
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</tbody>
</table>

**Term Semester Credit Hours**: 18

BSPH Directed Electives 2
Select nine hours from the following:
- BESC 314 Pathogens, the Environment and Society
- BESC 367 U.S. Environmental Regulations
- BESC 401 Bioenvironmental Microbiology
- BICH 410 Comprehensive Biochemistry I
- BICH 412 Biochemistry Laboratory I
- BICH 411 Comprehensive Biochemistry II
- CHEM 227 Organic Chemistry I
- CHEM 237 Organic Chemistry Laboratory
- CHEM 228 Organic Chemistry II
- CHEM 238 Organic Chemistry Laboratory
- ENTO 210 Global Public Health Entomology
- ENTO 433 The Science of Forensic Entomology
- FIVS 432 Applied Forensic Entomology
- GENE 301 Comprehensive Genetics
- GENE 312 Comprehensive Genetics Laboratory
- GENE 320/ BIMS 320 Biomedical Genetics
- PHLT 333 Accident Investigation
- PHLT 334 Fire Safety and Workplace Hazards
- PHLT 335 Hazardous Materials
- PHLT 416 Public Health Leadership and Ethics
- PHLT 485 Directed Studies
- PHLT 489 Special Topics In...
- PHYS 201 College Physics
- URPN 370 Health Systems Planning
- URPN 371 Environmental Health Planning and Policy
- VIBS 401 Developmental Neurotoxicology
- VIBS 407/ NRSC 407 Core Ideas in Neuroscience
- VIBS 413 Introduction to Epidemiology
- VIBS 420 Computer Applications in Public Health Research
- VIBS 432 Public Health Practices
- VTPB 408 Clinical Microbiology
- VTPB 409 Introduction to Immunology
- VTPB 438 Biomedical Virology
- VTPB 487/ BICL 487 Biomedical Parasitology
- VTPB 487/ BICL 487 Biomedical Parasitology
Select six hours from the following:

- BESC 314 Pathogens, the Environment and Society
- BESC 367 U.S. Environmental Regulations
- BESC 401 Bioenvironmental Microbiology
- BICH 410 Comprehensive Biochemistry I
- BICH 412 Biochemistry Laboratory I
- BICH 411 Comprehensive Biochemistry II
- CHEM 227 Organic Chemistry I
- CHEM 237 Organic Chemistry Laboratory
- CHEM 228 Organic Chemistry II
- CHEM 238 Organic Chemistry Laboratory
- ENTO 210 Global Public Health Entomology
- ENTO 423 Medical Entomology
- ENTO 431/FIVS 431 The Science of Forensic Entomology
- ENTO 432/FIVS 432 Applied Forensic Entomology
- GENE 301 Comprehensive Genetics
- GENE 312 Comprehensive Genetics Laboratory
- GENE 320/BIMS 320 Biomedical Genetics
- PHLT 333 Accident Investigation
- PHLT 334 Fire Safety and Workplace Hazards
- PHLT 335 Hazardous Materials
- PHLT 416 Public Health Leadership and Ethics
- PHLT 485 Directed Studies
- PHLT 489 Special Topics In...
- PHYS 201 College Physics
- PHYS 202 College Physics
- URPN 370 Health Systems Planning
- URPN 371 Environmental Health Planning and Policy
- VIBS 401 Developmental Neurotoxicology
- VIBS 407/NRSC 407 Core Ideas in Neuroscience
- VIBS 413 Introduction to Epidemiology
- VIBS 420 Computer Applications in Public Health Research
- VIBS 432 Public Health Practices
- VTPB 408 Clinical Microbiology
- VTPB 409 Introduction to Immunology
- VTPB 438 Biomedical Virology
- VTPB 487/BIOL 487 Biomedical Parasitology

<table>
<thead>
<tr>
<th>Term Semester Credit Hours</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Total Semester Credit Hours:</td>
<td>120</td>
</tr>
</tbody>
</table>

1. Chosen in consultation with BSPH academic advisor.
2. BSPH Directed Electives: courses that constitute the major are those offered by the School of Public Health and those approved for public health studies electives. Additional courses may be available. Students must check with their academic advisor.

Approval of degree plan does not guarantee access to courses. Students must satisfy prerequisites, and some course (writing intensive classes included) are available to majors only. It is the responsibility of the student
College of Science

Administrative Officers

Dean - H. Joseph Newton, Ph.D.
Executive Associate Dean - Michael B. Hall, Ph.D.
Associate Dean for Undergraduate Programs and Development - Timothy P. Scott, Ph.D.
Associate Dean for Faculty Affairs and Graduate Studies - Mark J. Zoran, Ph.D.
Associate Dean for Assessment and PreK-12 Education - Jane F. Schielack, Ph.D.
Associate Dean for External Relations - Marlan O. Scully, Ph.D.
Associate Dean for International Programs - Paulo Lima-Filho, Ph.D.
Associate Dean for Strategic Initiatives - W. Michael Kemp, Ph.D.
Associate Dean for Undergraduate Research and College Climate - Ginger Carney, Ph.D.
Assistant Dean for Finance and Administration - Julie B. Allen, B.B.A.

General Statement

Nature, its origins and its evolution, its strengths and its frailties, its order and its perceived disarray, constitutes the realm of study classified as science. Scientists search for interconnecting relationships and traits of order to understand the nature of our universe. Each new discovery provides additional knowledge and frequently enables the solution of previously perplexing questions. Often technology is able to transform scientific discovery into applications which are beneficial to our everyday living. Technology would be impoverished were it not for the new knowledge continually being sought by scientists. At the same time, science could not progress without the advances in instrumentation and techniques generated by technology. Thus, a symbiotic relationship exists between science and technology, a relationship which permeates the courses and programs in the college.

The departments of the College of Science are organized to respond to the needs of students for both general and specialized education in science in offering the Bachelor of Science and the Bachelor of Arts degrees in Biology, Chemistry, Mathematics, Physics and University Studies. The former degree permits heavy emphasis in selected subject matter and closely allied fields, whereas the latter degree is designed for the student who desires a more broadly based education while still specializing in one of the sciences. Additionally, the college offers a Bachelor of Science degree in Applied Mathematical Science.

For this reason, many students select a degree program in science to complete their prerequisite courses for professional study programs. The early admissions option to professional schools of dentistry or medicine in the zoology degree program provides the opportunity for a student to receive a degree in zoology if they are successful in gaining admission to a professional study program in medicine or dentistry prior to completion of a regular four-year degree program. To receive the degree, they must complete all requirements under this program and successfully complete their first year of medical or dental school.

In addition to the Departments of Biology, Chemistry, Mathematics, Physics and Astronomy, and Statistics, the College of Science includes the Cyclotron Institute, a research institute that emphasizes fundamental studies of nuclear science in which both undergraduate and graduate students participate. The College of Science offers MS and PhD programs in various departments.

General Degree Requirements

Degree requirements for science majors are organized into:

1. general requirements, including University Core Curriculum requirements and College of Science requirements;
2. requirements of the major field of study;
3. requirements of the minor field of study for those students completing a BA degree; and
4. electives.

With the exception of physical activity and general elective requirements, courses taken to satisfy degree requirements must be taken for letter grades.

Students are responsible for selecting the courses in their degree plan and assuring they abide by Texas A&M University Student Rules in meeting all degree requirements. Each department has advisors who should be consulted in developing degree programs.

General Requirements

General requirements include those which are required in every degree program at the University. Please refer to these requirements defined in the University Core Curriculum and graduation requirements in foreign language sections of this catalog. Special guidelines should be noted in the following categories:

American History

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. history course 1</td>
<td>3</td>
</tr>
<tr>
<td>U.S. history course 1</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Semester Credit Hours</strong></td>
<td><strong>6</strong></td>
</tr>
</tbody>
</table>

1 Students seeking teacher certification must complete HIST 105 and HIST 106.

Three hours in history may be substituted by successfully completing the required four semesters of upper-level ROTC curriculum.

Government/Political Science

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>POLS 206 American National Government</td>
<td>3</td>
</tr>
<tr>
<td>POLS 207 State and Local Government</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Semester Credit Hours</strong></td>
<td><strong>6</strong></td>
</tr>
</tbody>
</table>

Three hours in political science may be substituted by successfully completing the required four semesters of upper-level ROTC curriculum.

International and Cultural Diversity Requirements

The International and Cultural Diversity portion of the Graduation requirements may be fulfilled by 6 hours from the approved list of courses (see the International and Cultural Diversity requirements (p. 34).
These courses may be in addition to University Core Curriculum requirements, or if a course in this category satisfies an area of the Core, it can be used to meet both requirements.

**Major Field of Study**

Each department sets its own requirements for the major. At least 12 semester hours in the major must be completed in advanced courses (300- or 400-level) in residence at Texas A&M.

**Minor Field of Study**

The BA degree requires a minor field of study or an area of emphasis for students pursuing teacher certification. A minor requires 15–18 semester hours in one discipline. Six of these hours must be advanced (300- or 400-level) courses. Students must contact the department offering the minor to determine course requirements. Students pursuing a BS degree may select an optional minor. Contact the department offering the minor to determine course requirements. Students must declare a minor no later than the date on which they apply for graduation.

**Electives**

Electives should be chosen to enhance the student’s degree program and/ or complete professional school prerequisites if not contained in required courses in the degree plan. Elective courses must be above the minimum level required in other areas of the degree program. For example, MATH 102 is not acceptable because it is below the minimum requirement of calculus. Also, introductory courses to another field of study such as BIMS 101 and AGLS 101 will not count toward degree requirements. Lower-level ROTC courses are not acceptable as electives. Please consult an advisor when selecting electives.

**Curricular Options**

**Honors Program**

The College of Science participates in the University Honors Program designed to offer the superior student special opportunities for academic work of a range and depth appropriate to his or her capabilities and greater intellectual interests. For further information, refer to the section regarding the University Honors Program (p. 92).

**Cooperative Education Program**

Cooperative education enables students to gain practical work experience and a salary while completing academic requirements. During the four-year academic program, co-op students complete two to four periods of work away from campus, gaining experience through on-the-job training and thus improving their opportunities for future employment. The Cooperative Education Office provides additional information about this program.

**Minor Field of Study**

Each department in the College of Science offers a minor. Students interested in pursuing a minor in a field in the College should contact the department offering the minor.

**Summer Internships**

A number of programs are available throughout the country which offer summer employment to students interested in specific fields of study and training. Each departmental advisor has information pertaining to these programs.

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**Integrated Fast Track Bachelor’s and Master’s Degrees**

The Department of Mathematics provides the opportunity for ambitious and talented students to earn a bachelor’s and a master’s degree within a five year period. Eligible students earn graduate credit during their undergraduate study which allows them to complete this option. Interested students should contact the Mathematics Department if interested in this program.

**Preparation for Professional Studies**

Students interested in gaining admission to professional study programs in the health professions may do so through any course of study. Prerequisite course requirements may be completed as part of a regular degree program or through electives. Advising for students preparing for health profession careers is available, regardless of major, through the Office of Professional School Advising, Henderson Hall, (979) 847-8938.

**Medicine and Dentistry**

Curricula in biology, chemistry, mathematics and physics within the College of Science readily accommodate the required courses needed for admission to professional studies in medicine and dentistry. Admission to medical and dental schools require the following prerequisites:

<table>
<thead>
<tr>
<th>Chemistry</th>
</tr>
</thead>
</table>
| CHEM 101  Fundamentals of Chemistry I | 3  
| or CHEM 103  Structure and Bonding |  
| CHEM 113  Physical and Chemical Principles | 1  
| CHEM 102  Fundamentals of Chemistry II | 3  
| or CHEM 104  Chemistry of the Elements |  
| CHEM 114  Qualitative Analysis | 1  
| CHEM 227  Organic Chemistry I | 4  
| & CHEM 237  and Organic Chemistry Laboratory |  
| CHEM 228  Organic Chemistry II | 4  
| & CHEM 238  and Organic Chemistry Laboratory |  

<table>
<thead>
<tr>
<th>Biochemistry</th>
</tr>
</thead>
</table>
| BICH 410  Comprehensive Biochemistry I | 3  

<table>
<thead>
<tr>
<th>Biology</th>
</tr>
</thead>
</table>
| BIOL 111  Introductory Biology I | 4  
| BIOL 112  Introductory Biology II | 4  
| Two advanced biological sciences courses | 6  

<table>
<thead>
<tr>
<th>Physics</th>
</tr>
</thead>
</table>
| PHYS 201  College Physics | 4  
| or PHYS 218  Mechanics |  
| PHYS 202  College Physics | 4  
| or PHYS 208  Electricity and Optics |  

<table>
<thead>
<tr>
<th>Statistics</th>
</tr>
</thead>
</table>
| Select one of the following: | 3  
| STAT 301  Introduction to Biometry |  
| STAT 302  Statistical Methods |  
| STAT 303  Statistical Methods |  

<table>
<thead>
<tr>
<th>English</th>
</tr>
</thead>
</table>
| English course (p. 753) | 6  

---

*CHEM 101 and CHEM 103 are equivalent courses and may not be used together.*
Early Admission Program

The College of Science offers two methods of awarding a baccalaureate degree to students who gain admission to professional school prior to completion of their degree. The Baccalaureate Degree Option for Students Granted Early Admission to Medical/Professional Programs is available to all students regardless of their major.

Most students complete a four-year program prior to acceptance to professional school and thus it is advised a degree program leading to a standard baccalaureate degree be selected.

Veterinary Medicine

Please refer to the Admission Requirements—Professional Curriculum listed in the College of Veterinary Medicine and Biomedical Sciences.

Other Allied Health Programs

There are many allied health fields students may prepare for through degree programs in the College of Science. Prerequisite requirements for admission should be completed as part of a degree granting program.

Teacher Certification

The Secondary Teaching Certificate may be obtained in conjunction with a major in the College of Science. Requirements for teacher certification may be found at the aggieTEACH (http://aggieteach.tamu.edu) website.

Curricula in University Studies

The College of Science has four different University Studies degree plans. A University Studies Degree generally consists of a concentration of 21-24 hours and two minors of 15-18 hours each. Some concentrations and minors contain required courses that have additional prerequisites. One of the two minors must be completed in a college outside of the College of Science. The student’s diploma will list Bachelor of Science in University Studies. The student’s area of concentrations and the two minors will be indicated on the student’s transcript.

Interested students must complete the online application and have necessary minor field approvals. The degree plans and applications may be found at www.science.tamu.edu/academics/degrees.php.

Majors

College of Science

• Bachelor of Science in University Studies, Mathematics for Business Concentration (p. 568)
• Bachelor of Science in University Studies, Mathematics for Teaching Concentration (p. 570)
• Bachelor of Science in University Studies, Mathematics for Pre-Professionals Concentration (p. 569)
• Bachelor of Science in University Studies, Mathematics for Secondary Teaching Concentration (p. 569)

Department of Biology

• Bachelor of Arts in Biology (p. 524)
• Bachelor of Science in Biology (p. 525)
• Bachelor of Science in Microbiology (p. 526)
• Bachelor of Science in Molecular and Cell Biology (p. 527)
• Bachelor of Science in Zoology (p. 529)

Department of Chemistry

• Bachelor of Arts in Chemistry (p. 533)
• Bachelor of Arts in Chemistry, Biological Chemistry or Medical, Dental, Pharmacy School Track (p. 535)
• Bachelor of Arts in Chemistry, Chemical Education Track (p. 537)
• Bachelor of Arts in Chemistry, Environmental Chemistry Track (p. 539)
• Bachelor of Science in Chemistry (p. 540)
• Bachelor of Science in Chemistry, Biological Chemistry Track (p. 542)
• Bachelor of Science in Chemistry, Environmental Chemistry Track (p. 544)

Department of Mathematics

• Bachelor of Arts in Mathematics (p. 559)
• Bachelor of Science in Mathematics (p. 560)
• Bachelor of Science in Applied Mathematical Sciences, Actuarial Emphasis (p. 551)
• Bachelor of Science in Applied Mathematical Sciences, Biological Science Emphasis (p. 552)
• Bachelor of Science in Applied Mathematical Sciences, Computational Emphasis (p. 553)
• Bachelor of Science in Applied Mathematical Sciences, Economics Emphasis (p. 555)
• Bachelor of Science in Applied Mathematical Sciences, Math Emphasis (p. 556)
• Bachelor of Science in Applied Mathematical Sciences, Statistics Emphasis (p. 557)

Department of Physics and Astronomy

• Bachelor of Arts in Physics (p. 564)
• Bachelor of Science in Physics (p. 565)

Minors

Department of Biology

• Biology Minor (p. 530)

Department of Chemistry

• Chemistry Minor (p. 545)

Department of Mathematics

• Mathematics Minor (p. 561)

Department of Physics

• Astrophysics Minor (p. 566)
• Physics Minor (p. 566)

Department of Statistics

• Statistics Minor (p. 568)

Masters

Department of Biology

• Master of Science in Biology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/science/biology/ms)
With pollution of the environment, cause and cure of disease, population control, recurring food shortages, preservation of species and many other aspects resulting from the impact of technological changes on life forms. Those who are astounded by the array of living things on the earth and who seek challenging, creative work should consider a career in biology or in a biology-related field. The Department of Biology offers five distinct four-year curricula which lead to the baccalaureate degree. These are the Bachelor of Arts in Biology, Bachelor of Science in Biology, Bachelor of Science in Molecular and Cell Biology, Bachelor of Science in Microbiology and Bachelor of Science in Zoology. The curricula are designed to maximize postbaccalaureate opportunities in:

1. professional schools of medicine, veterinary medicine and dentistry;
2. allied health schools of physical and occupational therapy, physician assistant programs, optometry, pharmacy, and nursing;
3. graduate education leading to teaching and research careers in universities, in industry or in state or national agencies;
4. teaching at junior high or high school levels and
5. jobs in biotechnology, research laboratories, pharmaceutical companies and field biology.

The Department of Biology degree plans will enable students to complete all entrance requirements for graduate and professional schools as well as medical technology, pharmacy, optometry, nursing, physical therapy, and other paramedical and health support fields.

Advising

Because some careers in biology require advanced and/or specialized training, it is essential to take advantage of advising opportunities. In the Department of Biology, there are professional advisors in the Biology Undergraduate Programs Office. The advisor may be consulted prior to each registration period and as the student needs. Questions regarding registration, degree checks, transfer of courses, advanced placements and other academic matters are handled in the Office of Undergraduate Programs. Students with special interests in graduate study should consult the graduate advisor. Information concerning entrance to professional schools of medicine, dentistry and other health related fields is available from the Office of Professional School Advising.

Requirements for all Baccalaureate Degrees in the Department of Biology

Each student seeking a baccalaureate degree in the Department of Biology is required to master a common body of knowledge in science. In addition, the student must take courses essential to a liberal education. Students will note that the first two years of all curricula offered by the Department of Biology are similar. Students in the Department of Biology must make a grade of C or better in courses within the major used to satisfy required or directed electives and who seek challenging, creative work should consider a career in biology or in a biology-related field. The Department of Biology offers five distinct four-year curricula which lead to the baccalaureate degree. These are the Bachelor of Arts in Biology, Bachelor of Science in Biology, Bachelor of Science in Molecular and Cell Biology, Bachelor of Science in Microbiology and Bachelor of Science in Zoology. The curricula are designed to maximize postbaccalaureate opportunities in:

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Students in the Department of Biology must make a grade of C or better in BIOL 111 and BIOL 112. Additionally, students may have only one D in courses within the major used to satisfy required or directed electives for a given degree plan. It is required that the freshman and sophomore level biology, chemistry and math courses be completed before the start of the 5th full semester and before enrollment in any junior or senior level science.
Common Body of Knowledge

To assure that students have sufficient prerequisite training for advanced courses, Biology majors must complete a series of courses comprising a Common Body of Knowledge (CBK) prior to their junior year (5th full semester) and enrollment in upper level BIOL courses. A Biology student will be admitted into upper level Biology classes when he or she has met the following criteria:

Completion of a set of CBK courses (38 hours) before the student's 5th full semester to include:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 112</td>
<td>Introductory Biology II</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 213</td>
<td>Molecular Cell Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 214</td>
<td>Genes, Ecology and Evolution</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 111</td>
<td>Fundamentals of Chemistry Laboratory I</td>
<td></td>
</tr>
<tr>
<td>CHEM 102</td>
<td>Fundamentals of Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 112</td>
<td>Fundamentals of Chemistry Laboratory II</td>
<td></td>
</tr>
<tr>
<td>CHEM 227</td>
<td>Organic Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 237</td>
<td>Organic Chemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td>CHEM 228</td>
<td>Organic Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 238</td>
<td>Organic Chemistry Laboratory</td>
<td></td>
</tr>
</tbody>
</table>

Select one of the following: 8

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 147</td>
<td>Calculus I for Biological Sciences</td>
<td></td>
</tr>
<tr>
<td>&amp; MATH 148</td>
<td>Calculus II for Biological Sciences</td>
<td></td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
<td></td>
</tr>
<tr>
<td>&amp; MATH 152</td>
<td>Engineering Mathematics II</td>
<td></td>
</tr>
<tr>
<td>MATH 171</td>
<td>Analytic Geometry and Calculus</td>
<td></td>
</tr>
<tr>
<td>&amp; MATH 172</td>
<td>Calculus</td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 38

A grade of C or better must be earned.

A student must be in good academic standing with an overall grade point average of a 2.0 or better overall and in the major.

Process

Students will be audited by the department to monitor progress of completion of the CBK. Students failing to complete the CBK within the first four full semesters at Texas A&M University may be blocked and forced to change majors or be required to meet with an academic advisor to see if they can be successful in the major. Students registering for upper-level Biology classes without completing the CBK, or without approval of the Undergraduate Advising Office, will be dropped from the roster.

Transfer Students

1. Transfer from within Texas A&M University: The Biology Department will accept changes of major from other departments at Texas A&M upon completion of AT LEAST one semester of an applicable BIOL course taken at Texas A&M and AT LEAST one semester of an applicable CHEM course taken at Texas A&M, with a minimum 2.5 grade point average overall for courses taken at Texas A&M, a 2.5 grade point average in BIOL courses taken at Texas A&M, and a 2.5 or better grade point average in CHEM courses taken at Texas A&M. Students still must complete the CBK before being admitted to upper level BIOL courses.

2. Transfer students from other institutions to Biology must have completed the following:
   a. A minimum of 24 accredited college hours
   b. Sixteen hours of prescribed coursework:
      i. Eight hours of General Biology (TAMU BIOL 111 and BIOL 112 or Texas Common Course Numbers BIOL 1406 and 1407) with B's or better, and
      ii. Eight hours of General Chemistry (TAMU CHEM 101/CHEM 111 and CHEM 102/CHEM 112 or Texas Common Course Numbers CHEM 1411 and CHEM 1412) with B's or better, and
      iii. Eight hours of Calculus (TAMU MATH 147/MATH 148 or MATH 151/MATH 152 or MATH 171/MATH 172 or Texas Common Courses Numbers MATH 2413 and MATH 2414) with C's or better
   c. A minimum cumulative grade point average of a 3.0
   d. A minimum Biology and Chemistry grade point average of a 3.0

Human Biology Track

This unofficial track is for students interested in pursuing professional schools including medical, dental and allied health programs (e.g., nursing, occupational therapy, optometry, pharmacy, physical therapy and physician assistant). The focus of the science courses on human biology will better prepare these students for their chosen fields. Suggested courses include:

Social and Behavioral Science

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYC 107</td>
<td>Introduction to Psychology</td>
<td>3</td>
</tr>
<tr>
<td>or SOCI 205</td>
<td>or Introduction to Sociology</td>
<td></td>
</tr>
</tbody>
</table>

Biology Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 318</td>
<td>Chordate Anatomy</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 344</td>
<td>Embryology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 388</td>
<td>Principles of Animal Physiology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 437</td>
<td>Molecular and Human Medical Mycology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 454</td>
<td>Immunology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 456</td>
<td>Medical Microbiology</td>
<td>4</td>
</tr>
</tbody>
</table>

Free Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLTH 335</td>
<td>Human Diseases</td>
<td>3</td>
</tr>
<tr>
<td>HLTH 354</td>
<td>Medical Terminology for the Health Professions</td>
<td>3</td>
</tr>
<tr>
<td>URPN 370</td>
<td>Health Systems Planning</td>
<td>3</td>
</tr>
<tr>
<td>PSYC 107</td>
<td>Introduction to Psychology</td>
<td>3</td>
</tr>
<tr>
<td>or SOCI 205</td>
<td>or Introduction to Sociology</td>
<td></td>
</tr>
<tr>
<td>BIOL 318</td>
<td>Chordate Anatomy</td>
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</tr>
<tr>
<td>BIOL 344</td>
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<tr>
<td>BIOL 388</td>
<td>Principles of Animal Physiology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 437</td>
<td>Molecular and Human Medical Mycology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 454</td>
<td>Immunology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 456</td>
<td>Medical Microbiology</td>
<td>4</td>
</tr>
</tbody>
</table>

International and Cultural Diversity

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLTH 236</td>
<td>Race, Ethnicity and Health</td>
<td>3</td>
</tr>
<tr>
<td>HLTH 334/</td>
<td>Women's Health</td>
<td>3</td>
</tr>
<tr>
<td>WGST 334</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 65
Students should consult their academic advisor about the courses that best fit their career interests.

**Education Track**

This unofficial track is for students wishing to acquire state certification to teach at the secondary level upon graduation. Students should seek advice from the advisors within their department and from the College of Education and Human Development, as well as from the advisor in charge of their teaching option. The intention is to make the best possible use of social science, humanity, free and directed electives in the Bachelor of Arts in Biology, thereby condensing as many of the certification requirements as possible into the degree plan. Courses should include:

- **Social and Behavioral Science**
  - INST 210 Understanding Special Populations 3
  - INST 222 Foundations of Education in a Multicultural Society 3

- **Biology Electives**
  Upper-level BIOL courses, including two writing intensive courses (p. 660) 12

- **Free Electives**
  - RDNG 372 Reading and Writing across the Middle Grades Curriculum 3
  - or RDNG 465 or Reading in the Middle and Secondary Grades
  - TEFB 322 Teaching and Schooling in Modern Society 3
  - TEFB 324 Teaching Skills II 3
  - TEFB 406 Science in the Middle and Secondary School 3
  - Student teaching

**Total Semester Credit Hours** 30

**Marine Biology Track**

This unofficial track is for students requiring a more rigorous and in-depth foundation in biological courses that apply to marine environments and ecosystems. This suggested degree plan is ideal for students who intend to pursue graduate studies in marine biology or serve as field biologists at national seashores or sanctuaries. A minimum of 20 hours is required to fulfill this requirement, to be chosen from the following:

- **Biology Electives**
  - BIOL 335 Invertebrate Zoology 4
  - BIOL 440 Marine Biology 4
  - Related ZOOL research or field experience (p. 1025) 3

- **Free Electives**
  - OCNG 251 Oceanography 3
  - or OCNG 401 or Interdisciplinary Oceanography
  - or OCNG 420 or Introduction to Biological Oceanography
  - WFSC 311 Ichthyology 3
  - WFSC 425 Marine Fisheries 3

**Total Semester Credit Hours** 20

Students should consult their academic advisor about the courses that best fit their career interests.

**Ecology/Environmental Track**

This unofficial track is particularly designed for students interested in environmental consulting, environmental protection and ecosystem evaluation. This suggested degree plan can be adapted to focus on particular areas or populations within an ecosystem. A minimum of 18 hours is required to fulfill this requirement, to be chosen from the following:

- **Communication**
  - ENGL 210 Technical and Business Writing 3

- **Biology Electives**
  Select one of the following: 3-4
  - BIOL 335 Invertebrate Zoology
  - BIOL 357 Ecology
  - BIOL 358 Ecology Laboratory
  - BIOL 440 Marine Biology
  - BIOL 467 Integrative Animal Behavior
  - MEPS 313 Introduction to Plant Physiology

- **Free Electives**
  - CHEM 315 Quantitative Analysis 4
  - CHEM 318 & Quantitative Analysis Laboratory
  - ENTO 201 General Entomology 3
  - Select one of the following: 3-4
    - PLPA 301 Plant Pathology
    - PLPA 303 & Plant Pathology Laboratory
  - WFSC 311 Ichthyology
  - WFSC 401 General Mammalogy
  - WFSC 402 General Ornithology

**Total Semester Credit Hours** 17-18

Students should consult their academic advisor about the courses that best fit their career interests.

**Quantitative Biology Track**

This unofficial track is for students interested in applying quantitative approaches, including mathematical, statistical, and computational techniques, to fundamental problems in biology. Because courses for this track are still being developed in conjunction with the Departments of Mathematics and Statistics, students should check with their advisor for new quantitative biology courses:

- **Mathematics**
  - MATH 171 Analytic Geometry and Calculus 4
  - MATH 172 Calculus 4

- **Electives**
  - BIOL 289 Special Topics in... 1-4
  - MATH 308 Differential Equations 3

**Total Semester Credit Hours** 12-15

**Liberal Education Requirements of the University, College or State**

- American history elective (p. 23) 6
- Communication elective (p. 20) 6
- Language, philosophy and culture elective (p. 21) 3
- Government/Political science elective (p. 23) 6
- Social and behavioral sciences elective (p. 23) 3
- Creative arts elective (p. 22) 3
International and cultural diversity elective (p. 34)  0-6

Total Semester Credit Hours  27-33

Faculty

Alexander, Michael B, Lab Instructor
Biology
PhD, Texas A&M University, 2014

Aramayo, Rodolfo A, Associate Professor
Biology
PhD, University of Georgia, 1992

Armstrong, Beth E, Lab Instructor
Biology
MS, Texas A&M University, 2006

Aufderheide, Karl J, Associate Professor
Biology
PhD, University of Minnesota, 1974

Baumgardner, David E, Senior Lecturer
Biology
PhD, Texas A&M University, 2008

Bell-Pedersen, Deborah, Professor
Biology
PhD, State University of New York at Albany, 1991

Benedik, Michael J, Professor
Biology
PhD, Stanford University, 1982

Beremand, Phillip D, Lecturer
Biology
PhD, Indiana University Bloomington, 1979

Bernardo, Joseph, Research Associate Professor
Biology
PhD, Duke University, 1991

Carney, Ginger E, Associate Professor
Biology
PhD, University of Georgia, 1998

Chopra, Vimalarani, Lab Instructor
Biology
PhD, Bombay University, 1984

Cohn, William B, Senior Lecturer
Biology
PhD, Texas A&M University, 2000

Cricione, Charles D, Associate Professor
Biology
PhD, Oregon State University, 2005

Epps, Sharon V, Lab Instructor
Biology
MS, Texas A&M University, 2013

Erickson, James W, Associate Professor
Biology
PhD, University of Wisconsin-Madison, 1989

Gil Weir, Karine C, Lab Instructor
Biology
PhD, Texas A&M University, 2006

Gomer, Richard H, Professor
Biology
PhD, California Institute of Technology, 1983

Greenbaum, Ira F, Professor
Biology
PhD, Texas Tech University, 1978

Griffing, Lawrence R, Associate Professor
Biology
PhD, Stanford University, 1981

Hall, Timothy C, Senior Distinguished Professor
Biology
PhD, University of Nottingham, 1965

Hardin, Paul E, Distinguished Professor
Biology
PhD, Indiana University, 1987

Harlow, Mark L, Assistant Professor
Biology
PhD, Stanford University, 2001

Holzenburg, Andreas K, Professor
Biology
PhD, University of Gottingen, 1987

Johnson, Carol B, Senior Lecturer
Biology
PhD, University of Florida, 1984

Jones, Adam G, Professor
Biology
PhD, University of Georgia, 1998

Jung, Jae Hoon, Research Assistant Professor
Biology
PhD, Stanford University, 2009

Kemp, Walter M, Professor
Biology
PhD, Tulane University of Louisiana, 1969

Lai Hing, Ebony L, Lab Instructor
Biology
MS, Texas A&M University, 2010

Lee, Christopher P, Lecturer
Biology
BS, Texas A&M University, 1993

Lekven, Arne C, Associate Professor
Biology
PhD, University of California, Los Angeles, 1996

Lin, Xiaorong, Associate Professor
Biology
PhD, University of Georgia, 2003
Lints, Robyn, Associate Professor
Biology
PhD, University of Melbourne, Australia, 1993

Lockless, Steve W, Assistant Professor
Biology
PhD, University of Texas, Dallas, 2002

Lyons, Jacob I, Lab Instructor
Biology
BS, Texas A&M University, 1998

Mackenzie, Duncan S, Associate Professor
Biology
PhD, University of California, Berkeley, 1980

Maggert, Keith A, Associate Professor
Biology
PhD, University of California, San Diego, 2000

Manson, Michael D, Professor
Biology
PhD, Stanford University, 1976

McKnight, Thomas D, Professor
Biology
PhD, University of Georgia, 1983

McMahan, Uel J, Professor
Biology
PhD, University of Tennessee, 1964

Menet, Jerome, Assistant Professor
Biology
PhD, LOUIS PASTEUR UNIVERSITY, 2003

Merlin, Christine, Assistant Professor
Biology
PhD, University Pierre and Marie Curie, 2006

Moyes, Rita J, Instructional Assistant Professor
Biology
PhD, Texas A&M University, 1992

Nessner, Caitlin E, Lab Instructor
Biology
MS, Texas A&M University, 2014

Norton, Jerry D, Lab Instructor
Biology
PhD, University of Texas, Austin, 1994

Pal, Sangita, Lab Instructor
Biology
PhD, University of Calcutta, 1998

Pepper, Alan E, Associate Professor
Biology
PhD, University of California, Davis, 1990

Pilling, Darrell, Research Assistant Professor
Biology
PhD, University of Birmingham, 1995

Piskho, Elizabeth J, Lab Instructor
Biology
PhD, University of Texas, 1993

Qin, Hongmin, Associate Professor
Biology
PhD, Institute of Microbiology, Chinese Academy of Sciences, 1999

Rao, Asha, Lecturer
Biology
PhD, Texas A&M University, 2002

Riley, Bruce B, Professor
Biology
PhD, University of Wisconsin-Madison, 1990

Rosenthal, Gil G, Professor
Biology
PhD, University of Texas, Austin, 2000

Ryan, Kathryn J, Instructional Assistant Professor
Biology
PhD, Baylor College of Medicine, 1998

Sachs, Matthew S, Professor
Biology
PhD, Massachusetts Institute of Technology, 1986

Scott, Timothy P, Associate Professor
Biology
PhD, Texas A&M University, 1996

Siegele, Deborah A, Associate Professor
Biology
PhD, University of Wisconsin-Madison, 1989

Smith, James L, Associate Professor
Biology
PhD, University of Florida, 2002

Smotherman, Michael S, Associate Professor
Biology
PhD, University of California, Los Angeles, 1998

Sorg, Joseph A, Assistant Professor
Biology
PhD, University of Chicago, 2006

Stanford, Shawanda R, Lab Instructor
Biology
PhD, Mississippi State University, 2011

Sundaram, Sabarinath, Lab Instructor
Biology
PhD, Devi Ahilya University, 2005

Szule, Joseph A, Research Assistant Professor
Biology
PhD, University of Calgary, 2005

Tag, Andrew G, Lecturer
Biology
PhD, Texas A&M University, 2003
Taylor, Lathrop, Senior Lecturer
Biology
PhD, Texas A&M University, 1985

Thomas, Terry L, Professor
Biology
PhD, University of Georgia, 1975

Thompson, Wesley J, Professor
Biology
PhD, University of California, Berkeley, 1975

Versaw, Wayne K, Associate Professor
Biology
PhD, University of Wisconsin-Madison, 1995

Wan, Wei, Senior Lecturer
Biology
PhD, University of California, Davis, 2005

Wicksten, Mary K, Professor
Biology
PhD, University of Southern California, 1977

Winemiller, Leslie K, Senior Lecturer
Biology
PhD, University of Texas, Austin, 1989

Wright, Rachel N, Lab Instructor
Biology
PhD, Texas A&M University, 2011

Yu, Wangjie, Research Assistant Professor
Biology
PhD, Saitama Medical School, 2002

Zoran, Mark J, Professor
Biology
PhD, Iowa State University, 1987

Majors

- Bachelor of Arts in Biology (p. 524)
- Bachelor of Science in Biology (p. 525)
- Bachelor of Science in Microbiology (p. 526)
- Bachelor of Science in Molecular and Cell Biology (p. 527)
- Bachelor of Science in Zoology (p. 529)

Minors

- Biology Minor (p. 530)

Biology - BA

The BA degree in Biology, through the availability of a large number of electives, gives students maximum flexibility in earning a biology degree. The 15-18 hour minor requirement, including 6 hours of advanced courses in a discipline other than biology, provides students with the opportunity to include significant coursework in areas such as foreign language, business, education, or social sciences. The BA program is recommended for students with broad educational objectives or who intend to pursue further education in areas such as allied health professions, professional schools, or teaching certification.

Minors

- Biology Minor (p. 530)

Program Requirements

First Year

<table>
<thead>
<tr>
<th>Fall</th>
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<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>BIOL 111</td>
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<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
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<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
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<td>MATH 147</td>
<td>Calculus I for Biological Sciences</td>
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<td>Communication elective (p. 20)</td>
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Term Semester Credit Hours 15

Spring

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<td>BIOL 112</td>
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<tr>
<td>CHEM 102</td>
<td>Fundamentals of Chemistry II</td>
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Term Semester Credit Hours 15

Second Year

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<td>Organic Chemistry I</td>
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<td>&amp; CHEM 237</td>
<td>and Organic Chemistry Laboratory</td>
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<tr>
<td>PHYS 201</td>
<td>College Physics</td>
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<tr>
<td>American history elective (p. 23)</td>
<td>1,2 3</td>
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Term Semester Credit Hours 14

Spring

<table>
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<tr>
<th>Fall</th>
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<tbody>
<tr>
<td>BIOL 214</td>
<td>Genes, Ecology and Evolution</td>
<td>3</td>
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<tr>
<td>CHEM 228</td>
<td>Organic Chemistry II</td>
<td>4</td>
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<tr>
<td>&amp; CHEM 238</td>
<td>and Organic Chemistry Laboratory</td>
<td></td>
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<tr>
<td>PHYS 202</td>
<td>College Physics</td>
<td>4</td>
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<tr>
<td>American history elective (p. 23)</td>
<td>1,2 3</td>
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</table>

Term Semester Credit Hours 14

Total Semester Credit Hours: 58

1 Students seeking teacher certification must take HIST 105 and HIST 106. Other students may choose HIST 105 and HIST 106 or any 6 hours of American history courses (3 hours may be in Texas history).

2 Students successfully completing the required four semesters of upper-level ROTC courses may substitute these courses for 3 hours of American history and 3 hours of government/political science.

The following are CBK courses and must be completed prior to the start of 5th full semester: BIOL 111, BIOL 112, BIOL 213, BIOL 214, CHEM 101 & CHEM 111, CHEM 102 & CHEM 112, CHEM 227 & CHEM 237, CHEM 228 & CHEM 238, MATH 147, MATH 148.

Third Year

<table>
<thead>
<tr>
<th>Fall</th>
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<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>BICH 410</td>
<td>Comprehensive Biochemistry I</td>
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<tr>
<td>BICH 412</td>
<td>Biochemistry Laboratory I</td>
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<td>Course Title</td>
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<tr>
<td>Spring</td>
<td>13</td>
<td>BIOL 411: Comprehensive Biochemistry II</td>
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<td>POLS 207: State and Local Government</td>
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<td>Select one of the following:</td>
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<tr>
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<td>Any 300-400 level BIOL course (p. 660)</td>
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<td>GENE 302: Principles of Genetics &amp; GENE 312: Comprehensive Genetics Laboratory</td>
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<td>OCNG 420: Introduction to Biological Oceanography</td>
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<td>VIBS 343: Histology</td>
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<td>VIBS 443: Biology of Mammalian Cells and Tissues</td>
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</table>

**Total Program Hours 120**

**Biology - BS**

The BS degree in Biology is designed for students to obtain a comprehensive, solid foundation in the major branches of Biology. The degree provides the opportunity for extensive study across the breadth of biological disciplines, ranging from molecular and cellular biology to ecology and evolution. This degree plan is recommended for students preparing for graduate programs in biological sciences or any professional programs in health and medical sciences such as medical, dental or veterinary schools.

### Program Requirements

#### First Year

**Fall**

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 111: Introductory Biology I</td>
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<td>MATH 147: Calculus I for Biological Sciences</td>
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**Spring**

<table>
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<th>Course Title</th>
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<tr>
<td>BIOL 112: Introductory Biology II</td>
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<td>CHEM 102: Fundamentals of Chemistry II</td>
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#### Second Year

**Fall**

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<tbody>
<tr>
<td>BIOL 213: Molecular Cell Biology</td>
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**Spring**

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<tr>
<td>BIOL 214: Genes, Ecology and Evolution</td>
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<td>CHEM 228: Organic Chemistry II</td>
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<td>PHYS 202: College Physics</td>
<td>4</td>
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<tr>
<td>American history elective (p. 23)</td>
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</tbody>
</table>

### Notes

3. Students successfully completing the required four semesters of upper-level ROTC courses may substitute these courses for 3 hours of American history and 3 hours of government/political science.

4. Courses that cannot be used as free electives are: one hour introductory classes (BIMS 101, AGLS 101, etc.); MATH 102; BIOL 101, BIOL 107, BIOL 206; Corps-required courses (MILS, NVSC, AERS); CHEM 106/CHEM 116.

5. Two courses in the major must be designated as writing intensive.
Students successfully completing the required four semesters of upper-level ROTC courses may substitute these courses for 3 hours of American history and 3 hours of government/political science.

The following are CBK courses and must be completed prior to the start of the fifth full semester: BIOL 111, BIOL 112, BIOL 213, BIOL 214, CHEM 101, CHEM 111, CHEM 102, CHEM 112, CHEM 227, CHEM 237, CHEM 228, CHEM 238, MATH 147, MATH 148.

Third Year

Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BICH 410</td>
<td>Comprehensive Biochemistry I</td>
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</tr>
<tr>
<td>BICH 412</td>
<td>and Biochemistry Laboratory I</td>
<td>4</td>
</tr>
<tr>
<td>GENE 302</td>
<td>Principles of Genetics</td>
<td>3</td>
</tr>
<tr>
<td>GENE 312</td>
<td>and Comprehensive Genetics Laboratory</td>
<td>3</td>
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<td>STAT 302</td>
<td>Statistical Methods</td>
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**Total Semester Credit Hours:** 14

Spring

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>BICH 411</td>
<td>Comprehensive Biochemistry II</td>
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</tbody>
</table>

Select one of the following: 5

- Any 300-400 level BIOL course (p. 660)
- BICH 464 Bacteriophage Genomics
- 400 level GENE course (p. 793)
- OCNG 420 Introduction to Biological Oceanography
- VIBS 343 or Histology or Biology of Mammalian Cells
- VIBS 443 and Tissues
- Social and behavioral sciences elective (p. 23)
- Elective 3

**Total Semester Credit Hours:** 16

Microbiology - BS

The degree program in Microbiology is designed to provide a comprehensive education in the biology of microorganisms. A graduate of this program will have a thorough grounding in the classical areas of microbial physiology and biochemistry, microbial genetics, and developing areas like the molecular biology of microorganisms. The curriculum provides excellent training toward a career in any one of many areas of industrial microbiology and public health services. It is also an ideal preparation for advanced study or professional school in medicine, dentistry and other related fields, especially medical technology and biotechnology.

Program Requirements

First Year

Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
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<td>CHEM 101</td>
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<td>and Fundamentals of Chemistry Laboratory I</td>
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**Total Semester Credit Hours:** 15

Spring

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<th>Course Code</th>
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<tbody>
<tr>
<td>BIOL 112</td>
<td>Introductory Biology II</td>
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<td>CHEM 102</td>
<td>Fundamentals of Chemistry II</td>
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<td>&amp; CHEM 112</td>
<td>and Fundamentals of Chemistry Laboratory II</td>
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<td>MATH 148</td>
<td>Calculus II for Biological Sciences</td>
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**Total Semester Credit Hours:** 15

Second Year

Fall

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<th>Course Code</th>
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<tbody>
<tr>
<td>BIOL 213</td>
<td>Molecular Cell Biology</td>
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<td>CHEM 227</td>
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<td>PHYS 201</td>
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**Total Semester Credit Hours:** 15
American history elective (p. 23) 1,2  

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<tr>
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| Term Semester Credit Hours: | 58 |

1 Students seeking teacher certification must take HIST 105 and HIST 106. Other students may choose HIST 105 and HIST 106 or any 6 hours of American history courses (3 hours may be in Texas history).

2 Students successfully completing the required four semesters of upper-level ROTC courses may substitute these courses for 3 hours of American history and 3 hours of government/political science.

The following are CBK courses and must be completed prior to the start of 5th full semester: BIOL 111, BIOL 112, BIOL 213, BIOL 214, CHEM 101 & CHEM 111, CHEM 102 & CHEM 112, CHEM 227 & CHEM 237, CHEM 228 & CHEM 238, MATH 147, MATH 148.

### Third Year

#### Fall

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<tbody>
<tr>
<td>BICH 410</td>
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<td>BIOL 351</td>
<td>Fundamentals of Microbiology 5</td>
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<tr>
<td>GENE 302 &amp; GENE 312</td>
<td>Principles of Genetics 4 and Comprehensive Genetics Laboratory 4</td>
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<tr>
<td>STAT 302</td>
<td>Statistical Methods 3</td>
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| Term Semester Credit Hours | 14 |

#### Spring

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<td>Comprehensive Biochemistry II 3</td>
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<td>BICH 414</td>
<td>Biochemical Techniques I 2</td>
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<tr>
<td>BIOL 438</td>
<td>Bacterial Physiology 4</td>
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<td>Social and behavioral science elective (p. 23)</td>
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| Term Semester Credit Hours: | 17 |

#### Fourth Year

#### Fall

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<tr>
<td>BIOL 406/GENE 406</td>
<td>Bacterial Genetics 3</td>
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<tr>
<td>POLS 206</td>
<td>American National Government 3</td>
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<td>Select directed electives from the list below 5</td>
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<tr>
<td>Language, philosophy and culture elective (p. 21)</td>
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### Creative arts elective (p. 22) | 3 |

| Term Semester Credit Hours | 16 |

#### Spring

<table>
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<th>Course</th>
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<tbody>
<tr>
<td>POLS 207</td>
<td>State and Local Government 3</td>
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<tr>
<td>Select a directed elective from the list below</td>
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</tbody>
</table>

### Molecular and Cell Biology - BS

Students who select Molecular and Cell Biology as their major will receive a strong background in the cellular and molecular aspects of biology with particular emphasis on eukaryotes. The major provides an excellent
foundation for a career in biotechnology, genetic engineering, MD/PhD programs or basic biological research.

### Program Requirements

#### First Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Fall</th>
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<tbody>
<tr>
<td></td>
<td>BIOL 111</td>
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<tr>
<td></td>
<td>CHEM 101 &amp; CHEM 111</td>
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<tr>
<td></td>
<td>MATH 147</td>
</tr>
<tr>
<td></td>
<td>Communication elective (p. 20)</td>
</tr>
<tr>
<td></td>
<td><strong>Term Semester Credit Hours</strong></td>
</tr>
<tr>
<td>Spring</td>
<td>BIOL 112</td>
</tr>
<tr>
<td></td>
<td>CHEM 102 &amp; CHEM 112</td>
</tr>
<tr>
<td></td>
<td>MATH 148</td>
</tr>
<tr>
<td></td>
<td>Communication elective (p. 20)</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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#### Second Year

<table>
<thead>
<tr>
<th>Semester</th>
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<tbody>
<tr>
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<td>BIOL 213</td>
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<tr>
<td></td>
<td>CHEM 227 &amp; CHEM 237</td>
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<td></td>
<td>PHYS 201</td>
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<td>American history elective (p. 23)</td>
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<td></td>
<td><strong>Term Semester Credit Hours</strong></td>
</tr>
<tr>
<td>Spring</td>
<td>BIOL 214</td>
</tr>
<tr>
<td></td>
<td>CHEM 228 &amp; CHEM 238</td>
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<td>PHYS 202</td>
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<td></td>
<td>American history elective (p. 23)</td>
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<td></td>
<td><strong>Term Semester Credit Hours</strong></td>
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</tbody>
</table>

#### Total Semester Credit Hours: 58

1. Students seeking teacher certification must take HIST 105 and HIST 106. Other students may choose HIST 105 and HIST 106 or any 6 hours of American history courses (3 hours may be in Texas history).

2. Students successfully completing the required four semesters of upper-level ROTC courses may substitute these courses for 3 hours of American history and 3 hours of government/political science.

3. Students successfully completing the required four semesters of upper-level ROTC courses may substitute these courses for 3 hours of American history and 3 hours of government/political science.

4. Courses that cannot be used as free electives are: one hour introductory classes (BIMS 101, AGLS 101, etc.); MATH 102; BIOL 101, BIOL 107, BIOL 206; Corps-required courses (MILS, NVSC, AERS); CHEM 106/CHEM 116.

5. Two courses in the major must be designated as writing intensive.

### Directed Electives

Any 300-400 level BIOL course (p. 660)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
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<tbody>
<tr>
<td>BICH 410</td>
<td>Comprehensive Biochemistry I</td>
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</tr>
<tr>
<td>BIOL 351</td>
<td>Fundamentals of Microbiology</td>
<td>4</td>
</tr>
<tr>
<td>GENE 302 &amp; GENE 312</td>
<td>Principles of Genetics and Comprehensive Genetics Laboratory</td>
<td>4</td>
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<td>STAT 302</td>
<td>Statistical Methods</td>
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### Third Year

<table>
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<td>BIOL 414</td>
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<td>BIOL 423</td>
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<td></td>
<td>POLS 206</td>
</tr>
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<td></td>
<td>Language, philosophy and culture (p. 21)</td>
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<td></td>
<td>Elective</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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<td>POLS 207</td>
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<td>Select directed electives from the list below</td>
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<td></td>
<td>Creative arts (p. 22)</td>
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<td>Elective</td>
</tr>
<tr>
<td></td>
<td><strong>Term Semester Credit Hours</strong></td>
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</table>

#### Total Semester Credit Hours: 62

The following are CBK courses and must be completed prior to the start of 5th full semester: BIOL 111, BIOL 112, BIOL 213, BIOL 214, CHEM 101 & CHEM 111, CHEM 102 & CHEM 112, CHEM 227 & CHEM 237, CHEM 228 & CHEM 238, MATH 147, MATH 148.

### Cell Biology

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit</th>
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<tbody>
<tr>
<td>BIOL 430</td>
<td>Biological Imaging</td>
<td>4</td>
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<tr>
<td>VIBS 343</td>
<td>Histology</td>
<td>4</td>
</tr>
<tr>
<td>VIBS 443</td>
<td>Biology of Mammalian Cells and Tissues</td>
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### Organismal Biology

<table>
<thead>
<tr>
<th>Course</th>
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<th>Credit</th>
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<tr>
<td>BIOL 344</td>
<td>Embryology</td>
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<tr>
<td>BIOL 388</td>
<td>Principles of Animal Physiology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 434/ NRSC 434</td>
<td>Regulatory and Behavioral Neuroscience</td>
<td>3</td>
</tr>
</tbody>
</table>
Zoology - BS

The Zoology degree program is designed to expose students to all aspects of the study of animals. Following foundation courses on the principles of vertebrate and invertebrate zoology, students may select from a broad range of classes in animal biology, ranging from cellular and developmental biology, physiology, and anatomy to ecology and evolution. Graduates enter into advanced studies in zoology, specialized zoological fields in agriculture and renewable resources, or such professional fields as medicine, veterinary medicine, dentistry and other health-related areas.

Program Requirements

First Year

Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
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<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
<td>4</td>
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<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
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<tr>
<td>MATH 147</td>
<td>Calculus I for Biological Sciences</td>
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Term Semester Credit Hours: 15

Spring

<table>
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<tr>
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<th>Course Title</th>
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<tbody>
<tr>
<td>BIOL 112</td>
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<tr>
<td>CHEM 102</td>
<td>Fundamentals of Chemistry II</td>
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<td>&amp; CHEM 112</td>
<td>and Fundamentals of Chemistry Laboratory II</td>
<td></td>
</tr>
<tr>
<td>MATH 148</td>
<td>Calculus II for Biological Sciences</td>
<td>4</td>
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Term Semester Credit Hours: 15

Second Year

Fall

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<tbody>
<tr>
<td>BIOL 213</td>
<td>Molecular Cell Biology</td>
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<tr>
<td>BIOL 335</td>
<td>Invertebrate Zoology</td>
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<tr>
<td>BIOL 466</td>
<td>Principles of Evolution</td>
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Spring

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>BIOL 335</td>
<td>Invertebrate Zoology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 466</td>
<td>Principles of Evolution</td>
<td>3</td>
</tr>
</tbody>
</table>

Biological Sciences - BS

The Biological Sciences degree program is designed to prepare students for careers in biology, science education, and other fields requiring strong biological sciences backgrounds. Following foundation courses on the principles of biology, students may select from a broad range of classes in cell and molecular biology, genetics, and evolution, ranging from cellular and developmental biology, physiology, and genetics to ecology and evolution. Graduates enter into advanced studies in biology, specialized biological sciences fields in agriculture, veterinary medicine, dentistry, and related professional fields, or such professional fields as medicine, veterinary medicine, dentistry and other health-related areas.

Program Requirements

First Year

Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<td>BIOL 111</td>
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</tr>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
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<tr>
<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
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<td>MATH 147</td>
<td>Calculus I for Biological Sciences</td>
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Term Semester Credit Hours: 15

Spring

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<td>and Fundamentals of Chemistry Laboratory II</td>
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<td>MATH 148</td>
<td>Calculus II for Biological Sciences</td>
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Term Semester Credit Hours: 15

Second Year

Fall

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<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIOL 213</td>
<td>Molecular Cell Biology</td>
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<td>BIOL 335</td>
<td>Invertebrate Zoology</td>
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<td>Principles of Evolution</td>
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</table>

Spring

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>BIOL 335</td>
<td>Invertebrate Zoology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 466</td>
<td>Principles of Evolution</td>
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</table>
POLS 207  State and Local Government  3
Select a directed elective from the list below  4

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<th>Term</th>
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<tbody>
<tr>
<td>Total Semester Credit Hours</td>
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</tr>
</tbody>
</table>

Directed Electives

Any 300-400 level BIOL course (p. 660)

OCNG 420  3

Developmental Biology

BIOL 344  Embryology  4
BIOL 413  Cell Biology  3
BIOL 414  Developmental Biology  3
BIOL 423  Cell Biology Laboratory  1
BIOL 430  Biological Imaging  4
BIOL 434/ NRSC 434  Regulatory and Behavioral Neuroscience  4
BIOL 435  Laboratory for Regulatory and Behavioral Neuroscience  1
GENE 431/ BICH 431  Molecular Genetics  3

Ecology/Evolution

BIOL 357  Ecology  3
BIOL 358  Ecology Laboratory  1
BIOL 440  Marine Biology  4
BIOL 467  Integrative Animal Behavior  3
ENTO 313  Biology of Insects  3
GENE 412  Population and Ecological Genetics  3
WFSC 311  Ichthyology  3
WFSC 315  Herpetology  3
WFSC 401  General Mammalogy  3
WFSC 402  General Ornithology  3
WFSC 422  Ethology  3

Physiology/Neuroscience

BIOL 405  Comparative Endocrinology  3
BIOL 413  Cell Biology  3
BIOL 423  Cell Biology Laboratory  1
BIOL 434/ NRSC 434  Regulatory and Behavioral Neuroscience  3
BIOL 435  Laboratory for Regulatory and Behavioral Neuroscience  1
BIOL 454  Immunology  3
GENE 431/ BICH 431  Molecular Genetics  3
WFSC 422  Ethology  3

Preveterinary Medicine

BIOL 351  Fundamentals of Microbiology  3
NUTR 303/ ANSC 303  Principles of Animal Nutrition  4

3 Courses that cannot be used as free electives are: one hour introductory classes (BIMS 101, AGLS 101, etc.); MATH 102; BIOL 101, BIOL 107, BIOL 206; Corps-required courses (MILS, NVSC, AERS); CHEM 106/CHEM 116.

4 Students successfully completing the required four semesters of upper-level ROTC courses may substitute these courses for 3 hours of American history and 3 hours of government/political science.

5 Two courses in the major must be designated as writing intensive.

In order to qualify for the secondary provisional teaching certificate, see requirements listed in the College of Education and Human Development section under secondary certification.

Biology - Minor

A minor in Biology should represent coursework taken in the discipline beyond courses that might be used to satisfy core curriculum science requirements (8 credits). Therefore, though BIOL 111 and BIOL 112 are prerequisites to all of the listed courses, they are not considered part of the minor program. The coursework listed represents various sub-disciplines within the field of Biology and would give the student an overall knowledge base fitting a Minor in Biology.

Program Requirements

Students must have a C average in all courses taken for a minor in Biology. BIOL 491 and BIOL 485 credits will not be allowed to count for the minor, nor used in the Biology GPA calculation.

Required Courses

BIOL 213  Molecular Cell Biology  3
BIOL 214  Genes, Ecology and Evolution  3
BIOL 351  Fundamentals of Microbiology  4

Upper Level Biology

Select two of the following:  6

300-400 level BIOL course (p. 660)
GENE 302  Principles of Genetics
& GENE 312  and Comprehensive Genetics Laboratory
OCNG 420  Introduction to Biological Oceanography
BICH 464  Bacteriophage Genomics

Total Semester Credit Hours  16

Department of Chemistry

An understanding of chemistry is critical to an understanding of life and its associated activities. Chemistry and chemical principles profoundly influence the way we live, communicate and interact with one another so it is little wonder that a strong background in chemistry provides a solid foundation for a variety of careers of major importance in the twenty-first century. Chemistry is uniquely positioned at the crossroad between the biological and physical sciences. By exploiting their understanding of both realms, chemists and other professionals with strong backgrounds in chemistry have made, and continue to make, major contributions to improve the human condition. Major technological and biological discoveries almost always depend on a fundamental understanding of chemistry and the pursuit of these discoveries, as a way to improve the world in which we live, drives those who seek to be a part of the process.

The Department of Chemistry offers coursework and research in all the major areas of chemistry, organized into programs leading to the degrees of Bachelor of Arts and Bachelor of Science. Both degree programs are suitable as terminal degree programs as well as for preparation for more advanced study in chemistry and related areas or as preparation
for many professional programs in a variety of career fields. The BS program is more rigorous with respect to required mathematics, physics and chemistry courses. It is particularly appropriate for those students who plan a career in the chemical industry or who intend to pursue advanced degrees in chemistry, biochemistry, chemical physics or forensics. An attractive number of free electives in this degree program allows students to take courses in interdisciplinary focus areas. The BA program offers the greatest degree of flexibility for students who see chemistry as a springboard into a related career field such as medicine, pharmacy, law, science writing, teaching or business for example. Chemistry majors are counseled by PhD chemistry faculty advisors fully familiar with the many options available in the chemistry and other departments, so as to optimize each student’s program of study to meet individual needs. The Department of Chemistry (http://chem.tamu.edu) website provides additional information about the degree plans, advising, and career opportunities for chemistry majors.

Although students may choose a variety of electives and/or minors in either the BA or BS degree programs, the following chemistry tracks have been developed to guide students in choosing electives.

Chemistry Tracks

In addition to the traditional BS degree (which allows for optional minors) and the traditional BA degree (minor required), the Department of Chemistry offers five tracks to guide students in their selection of electives for particular career paths in biological chemistry, environmental chemistry, chemical education, medicine, dentistry and pharmacy. A traditional minor requires that all minor courses must be taken from the same department and approved by the department granting the minor. These tracks provide the student an opportunity to replace a traditional minor with a broad spectrum of elective courses focused, not in a single department, but in an area of emphasis. A list of the recommended elective courses for each track may be obtained from the Office of the Undergraduate Advisor in Room 104 Chemistry Building or from the Department of Chemistry (http://chem.tamu.edu) website.

Cooperative Education Program in Chemistry

Under suitable circumstances, chemistry majors may participate in a cooperative education program in which the student alternates periods of attendance at the University with periods of employment in industry. This year-round cooperative program of college study and industrial experience is educationally enriching and meaningful, and also has the benefit of providing substantial financial assistance to the student without unduly prolonging the completion of the BS or BA degree program.

Faculty

Banerjee, Sarbajit, Professor Chemistry PhD, State University of New York at Stony Brook, 2004
Barondeau, David P, Associate Professor Chemistry PhD, Texas A&M University, 1996
Batteas, James D, Professor Chemistry PhD, University of California, Berkeley, 1995
Begley, Tadhg P, Distinguished Professor Chemistry PhD, California Institute of Technology, 1983
Bergbreiter, David E, Professor Chemistry PhD, Massachusetts Institute of Technology, 1974
Bethel, Ryan D, Lecturer Chemistry PhD, Texas A&M University, 2014
Bevan, John W, Professor Chemistry PhD, University of London, 1975
Bluemel, Janet F, Professor Chemistry PhD, Technical University of Munich, Germany, 1989
Brown, Lawrence S, Instructional Assistant Professor Chemistry PhD, Princeton University, 1983
Burgess, Kevin, Professor Chemistry PhD, University of Cambridge, 1983
Clearfield, Abraham, Distinguished Professor Chemistry PhD, Rutgers University, 1954
Darensbourg, Donald J, Distinguished Professor Chemistry PhD, University of Illinois at Urbana-Champaign, 1968
Darensbourg, Marcetta, Distinguished Professor Chemistry PhD, University of Illinois at Urbana-Champaign, 1967
Dempsey, Scotty L, Lecturer Chemistry PhD, Texas A&M University, 2014
Dunbar, Kim R, Distinguished Professor Chemistry PhD, Purdue University, 1984
Fang, Lei, Assistant Professor Chemistry PhD, Northwestern University, 2010
Folden, Charles M, Assistant Professor Chemistry PhD, University of California, Berkeley, 2004
Gabbai, Francois P, Professor Chemistry PhD, Technische Universitat, Germany, 1999
Gaebe, Holly C, Instructional Assistant Professor Chemistry PhD, University of California, Berkeley, 1995
Gamez, Roberto C, Lab Instructor
Chemistry
PhD, Texas A&M University, 2014

Gladysz, John A, Distinguished Professor
Chemistry
PhD, Stanford University, 1974

Goodey, Joanna R, Senior Lecturer
Chemistry
PhD, University of Houston, 2001

Gopalakrishnan, Ganesa, Senior Lecturer
Chemistry
PhD, University of Madras, 1977

Hall, Michael B, Professor
Chemistry
PhD, University of Wisconsin-Madison, 1971

Harding, Kenn E, Professor
Chemistry
PhD, Stanford University, 1968

Hilty, Christian B, Associate Professor
Chemistry
PhD, ETH Zurich, Germany, 2004

Hughbanks, Timothy R, Professor
Chemistry
PhD, Cornell University, 1983

Jiang, Lin, Lecturer
Chemistry
PhD, Miami University, 2013

Keeney-Kennicutt, Wendy, Instructional Assistant Professor
Chemistry
PhD, Texas A&M University, 1982

Laane, Jaan, Professor
Chemistry
PhD, Massachusetts Institute of Technology, 1967

Lim, Soon Mi, Lecturer
Chemistry
PhD, Texas A&M University, 2006

Lindahl, Paul A, Professor
Chemistry
PhD, Massachusetts Institute of Technology, 1985

Liu, Wenshe, Associate Professor
Chemistry
PhD, University of California, Davis, 2005

Lucchese, Robert R, Professor
Chemistry
PhD, California Institute of Technology, 1982

MacFarlane, Ronald D, Distinguished Professor
Chemistry
PhD, Carnegie Institute of Technology, 1959

Mawk, Elmo J, Senior Lecturer
Chemistry
PhD, Texas A&M University, 1999

McCarty, Stephanie A, Lecturer
Chemistry
PhD, George Washington University, 2009

Mullen, Christine A, Senior Lecturer
Chemistry
PhD, University of California, San Diego, 2000

Natowitz, Joseph B, Senior Professor
Chemistry
PhD, University of Pittsburgh, 1965

Nippe, Michael, Assistant Professor
Chemistry
PhD, University of Wisconsin-Madison, 2011

North, Simon W, Professor
Chemistry
PhD, University of California, Berkeley, 1995

Ozerov, Oleg V, Professor
Chemistry
PhD, University of Kentucky, 2000

Pennington, James D, Instructional Assistant Professor
Chemistry
PhD, University of Michigan, 1998

Ponnamperruma, Krishan, Senior Lecturer
Chemistry
PhD, University of Cambridge, UK, 1992

Potts, Jessica L, Lab Instructor
Chemistry
MA, Texas State University, 2014

Prosvirin, Andrey, Lab Instructor
Chemistry
PhD, Physical-Technical Institute-Russian Academy of Sciences, 1997

Raushel, Frank M, Distinguished Professor
Chemistry
PhD, University of Wisconsin-Madison, 1976

Romo, Daniel, Professor
Chemistry
PhD, Colorado State University, 1991

Rosynuk, Michael P, Professor
Chemistry
PhD, Rice University, 1972

Russell, David H, Professor
Chemistry
PhD, University of Nebraska, 1978

Sanchez McKinley, Florinda R, Lab Instructor
Chemistry
MS, Lamar University, 2008
Santander, Patricio J, Senior Lecturer
Chemistry
PhD, Texas A&M University, 1987

Schweikert, Emile A, Professor
Chemistry
PhD, Universite de Paris, France, 1964

Sheldon, Matthew T, Assistant Professor
Chemistry
PhD, University of California, Berkeley, 2010

Singleton, Daniel A, Professor
Chemistry
PhD, University of Minnesota, 1986

Skiles, Stephanie L, Lecturer
Chemistry
PhD, Texas A&M University, 2014

Son, Dong H, Associate Professor
Chemistry
PhD, University of Texas, Austin, 2002

Soriaga, Manuel P, Professor
Chemistry
PhD, University of Hawaii, 1978

Tiner, Tammy H, Senior Lecturer
Chemistry
PhD, Texas A&M University, 1981

Vigh, Gyula, Senior Professor
Chemistry
PhD, University of Pannonia, 1975

Watanabe, Coran M, Associate Professor
Chemistry
PhD, John Hopkins University, 1999

Werke, Carrie B, Lab Instructor
Chemistry
MS, Texas A&M University, 2014

Wheeler, Steven E, Associate Professor
Chemistry
PhD, University of Georgia, 2006

Williamson, Vickie M, Instructional Assistant Professor
Chemistry
PhD, University of Oklahoma, 1992

Wooley, Karen L, Distinguished Professor
Chemistry
PhD, Cornell University, 1993

Yeager, Danny L, Professor
Chemistry
PhD, California Institute of Technology, 1975

Yennello, Sherry J, Professor
Chemistry
PhD, Indiana University, 1990

Zhou, Hongcai, Professor
Chemistry
PhD, Texas A&M University, 2000

**Majors**

- Bachelor of Arts in Chemistry (p. 533)
- Bachelor of Arts in Chemistry, Biological Chemistry or Medical, Dental, Pharmacy School Track (p. 535)
- Bachelor of Arts in Chemistry, Chemical Education Track (p. 537)
- Bachelor of Arts in Chemistry, Environmental Chemistry Track (p. 539)
- Bachelor of Science in Chemistry (p. 540)
- Bachelor of Science in Chemistry, Biological Chemistry Track (p. 542)
- Bachelor of Science in Chemistry, Environmental Chemistry Track (p. 544)

**Minors**

- Minor in Chemistry (p. 545)

**Chemistry - BA**

The Bachelor of Arts program, through the availability of a generous number of electives, gives the student a firm and broadly based foundation in chemistry, with the option of pursuing other educational objectives involving specialization in at least one other field in depth. This objective is accomplished by means of the BA program flexibility and by the inclusion of a minor area of study in another discipline or completion of a track as outlined above. Additional elective hours allow further diversification.

The BA degree offers somewhat more flexibility than the BS program, in terms of tailoring a program of study that combines chemistry with an interest in subject areas such as biochemistry, biology, business, computer science, education, forensics, medicine or physics. Although the BA program may in any specific case turn out to be a somewhat less technical curriculum, it meets the needs of many students who plan to use chemistry as a springboard to a career in chemical sales, marketing, law, technical writing, teaching at a pre-college level, science journalism, etc., to name only a few possibilities.

A BA degree in Chemistry coupled with a minor in Biology, or completion of a biological chemistry track, is excellent preparation for a variety of careers in the health-related disciplines. In particular, a BA degree in Chemistry is excellent and proven preparation for medical and dental schools, and affords the superior student the opportunity to maintain flexibility for a broad spectrum of medical or dental careers.

Although not required for the BA program, abundant research opportunities are available to students. The BA program also permits and encourages non-technical elective courses.

**Program Requirements**

**First Year**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
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CHEM 100 Horizons in Chemistry 1

Select one of the following:

4
<table>
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<th>Course Code</th>
<th>Course Title</th>
<th>Term</th>
<th>Semester</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
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<tr>
<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
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<td>CHEM 103</td>
<td>Structure and Bonding</td>
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<tr>
<td>&amp; CHEM 113</td>
<td>and Physical and Chemical Principles</td>
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<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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<td>History of the United States</td>
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<td>MATH 151 or</td>
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<td>MATH 171</td>
<td>Calculus</td>
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</table>

**Term Semester Credit Hours** 15

**Spring**

Select one of the following:

- CHEM 102 & CHEM 112 Fundamentals of Chemistry II and Fundamentals of Chemistry Laboratory II
- CHEM 104 & CHEM 114 Chemistry of the Elements and Qualitative Analysis
- HIST 106 History of the United States
- MATH 152 or MATH 172 Engineering Mathematics II or Calculus

Select one of the following:

- Communication (p. 20)
- Language, philosophy and culture (p. 21)
- Creative arts (p. 22)
- Social and behavioral sciences (p. 23)
- International and cultural diversity (p. 34)
- Course for Minor
- Chemistry track course

- CHEM 485 Directed Studies
- CHEM 491 Research

**Term Semester Credit Hours** 15

**Second Year**

**Fall**

- CHEM 227 Organic Chemistry I
- CHEM 231 Techniques of Organic Chemistry
- PHYS 218 Mechanics
- POLS 207 State and Local Government

Select one of the following:

- Communication (p. 20)
- Language, philosophy and culture (p. 21)
- Creative arts (p. 22)
- Social and behavioral sciences (p. 23)
- International and cultural diversity (p. 34)
- Course for Minor
- Chemistry track course

- CHEM 485 Directed Studies
- CHEM 491 Research

**Term Semester Credit Hours** 15

**Spring**

- CHEM 228 Organic Chemistry II
- CHEM 234 Organic Synthesis and Analysis IV
- PHYS 208 Electricity and Optics
- POLS 206 American National Government

Select one of the following:

- Communication (p. 20)
- Language, philosophy and culture (p. 21)
- Creative arts (p. 22)
- Social and behavioral sciences (p. 23)
- International and cultural diversity (p. 34)
- Course for Minor
- Chemistry track course

- CHEM 485 Directed Studies
- CHEM 491 Research

**Term Semester Credit Hours** 15

**Third Year**

**Fall**

- CHEM 315 Quantitative Analysis
- CHEM 318 Quantitative Analysis Laboratory
- CHEM 327 Physical Chemistry I

Select three of the following:

- Communication (p. 20)
- Language, philosophy and culture (p. 21)
- Creative arts (p. 22)
- Social and behavioral sciences (p. 23)
- International and cultural diversity (p. 34)
- Course for Minor
- Chemistry track course

- CHEM 485 Directed Studies
- CHEM 491 Research

**Term Semester Credit Hours** 15

**Spring**

- CHEM 325 Physical Chemistry Laboratory I
- CHEM 328 Physical Chemistry II

Select four of the following:

- Communication (p. 20)
- Language, philosophy and culture (p. 21)
- Creative arts (p. 22)
- Social and behavioral sciences (p. 23)
- International and cultural diversity (p. 34)
- Course for Minor
- Chemistry track course

- CHEM 485 Directed Studies
- CHEM 491 Research

**Term Semester Credit Hours** 15

**Fourth Year**

**Fall**

- CHEM 326 Physical Chemistry Laboratory II
- CHEM 481 Seminar

Select one of the following:

- CHEM 317 Quantitative Analysis
- CHEM 320 Instrumental Analysis Laboratory
- CHEM 362 Descriptive Inorganic Chemistry

**Term Semester Credit Hours** 15

**Spring**

- CHEM 327 Physical Chemistry Laboratory I
- CHEM 481 Seminar

Select one of the following:

- CHEM 317 Quantitative Analysis
- CHEM 320 Instrumental Analysis Laboratory
- CHEM 362 Descriptive Inorganic Chemistry

**Term Semester Credit Hours** 15
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<th>Course Code</th>
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<td>CHEM 456</td>
<td>Chemical Biology</td>
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<td>CHEM 462</td>
<td>Inorganic Chemistry</td>
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<td>CHEM 464</td>
<td>Nuclear Chemistry</td>
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<td>CHEM 466</td>
<td>Polymer Chemistry</td>
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<td>CHEM 483</td>
<td>Green Chemistry</td>
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<td>CHEM 489</td>
<td>Special Topics in...</td>
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<td>BICH 410</td>
<td>Comprehensive Biochemistry I</td>
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<td>BICH 411</td>
<td>Comprehensive Biochemistry II</td>
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<td>BICH 440</td>
<td>Biochemistry I</td>
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<td>BICH 441</td>
<td>Biochemistry II</td>
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<tr>
<td>PHYS 309</td>
<td>Modern Physics</td>
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</table>

Select two of the following: 

- Communication (p. 20)
- Language, philosophy and culture (p. 21)
- Creative arts (p. 22)
- Social and behavioral sciences (p. 23)
- International and cultural diversity (p. 34)

Course for Minor:

CHEM 485 Directed Studies

<table>
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<tr>
<th>Course Code</th>
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<table>
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<tbody>
<tr>
<td></td>
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<td>120</td>
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</tbody>
</table>

1. Choose a section designated for chemistry majors.
2. Students may substitute any 6 hours of American history courses approved by the University Core Curriculum to fulfill this requirement, but no more than 3 hours may be in Texas history. Students seeking teacher certification must take HIST 105 and HIST 106.
3. These electives must include 12 hours which meet the language, philosophy and culture (3 hours), creative arts (3 hours), social and behavioral science (3 hours) and communication (3 hours) requirements of the University Core Curriculum. In addition, 6 hours of courses must be in the area of international and cultural diversity. These may be in addition to the previous 12 hours of University Core Curriculum courses, or if a course in this category satisfies an area of the Core, it can be used to meet both requirements. Additional elective hours must be used to complete a required minor approved by the granting department or students must satisfy the requirements of one of the approved chemistry track programs. BA chemistry majors may take CHEM 485 or CHEM 491 as elective courses. The total hours of CHEM 485 and CHEM 491 taken on a graded (A-F) basis may not exceed 9. Additional hours of these courses may be taken on an S/U basis. A maximum of 6 hours of these courses may be included on the degree plan. Electives should be chosen in consultation with the chemistry advisor, and should be selected to meet the residency requirement (36 hours at 300-400-level must be taken at TAMU). Electives recommended in the various track programs should be strongly considered.
4. This is a designated C- or W-course.

Chemistry - BA, Biological Chemistry or Medical, Dental, Pharmacy School Track

Many students planning to enter medical, dental, or pharmacy school prefer a bachelor of arts degree that contains a large number of elective courses which may be used to satisfy pre-professional school requirements. With that in mind, this track recommends an effective way to use some of the available free electives in the BA chemistry program to satisfy the pre-professional requirements for these programs. Courses in anatomy, biochemistry, biology, genetics, and microbiology are recommended. Additional free electives, of which there will be many, may be used to strengthen the student’s program of study in a manner decided by the student and the academic advisor.

Program Requirements

**First Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
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<tr>
<td>CHEM 100</td>
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<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
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<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory</td>
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</table>
CHEM 103 Structure and Bonding
& CHEM 113 and Physical and Chemical Principles
ENGL 104 Composition and Rhetoric
HIST 105 History of the United States
MATH 151 or Engineering Mathematics I or Analytic
MATH 171 Geometry and Calculus

**Term Semester Credit Hours** 15

**Spring**
Select one of the following:
CHEM 102 Fundamentals of Chemistry II
& CHEM 112 and Fundamentals of Chemistry Laboratory
II
CHEM 104 Chemistry of the Elements
& CHEM 114 and Qualitative Analysis
HIST 106 History of the United States
MATH 152 or Engineering Mathematics II or Calculus
MATH 172
Biological Chemistry Track Elective

BIOL 111 Introductory Biology I

**Second Year**

**Fall**
CHEM 227 Organic Chemistry I
CHEM 231 Techniques of Organic Chemistry
Biological Chemistry Track Elective

BIOL 112 Introductory Biology II
POLS 207 State and Local Government

Select one of the following:

Communication (p. 20)
Language, philosophy and culture (p. 21)
Creative arts (p. 22)
Social and behavioral sciences (p. 23)
International and cultural diversity (p. 34)
Course for Minor

**Term Semester Credit Hours** 15

**Spring**
CHEM 315 Quantitative Analysis
CHEM 318 Quantitative Analysis Laboratory
PHYS 208 Electricity and Optics
Biological Chemistry Track Elective

BIOL 301 or Comprehensive Genetics or Biomedical
GENE 320 Genetics

**Third Year**

**Fall**
CHEM 315 Quantitative Analysis
CHEM 318 Quantitative Analysis Laboratory
PHYS 208 Electricity and Optics

Biological Chemistry Track Elective

**Fourth Year**

**Fall**
CHEM 481 Seminar
CHEM 328 Physical Chemistry II
CHEM 325 Physical Chemistry Laboratory I

Select one of the following:

BICH 410 Comprehensive Biochemistry I
BICH 440 Biochemistry I

Select one of the following from the Biological Chemistry track

BIOL 320 Integrated Human Anatomy and Physiology
II
BIOL 388 Principles of Animal Physiology
VTPP 423 Biomedical Physiology I

Select one of the following:

Communication (p. 20)
Language, philosophy and culture (p. 21)
Creative arts (p. 22)
Social and behavioral sciences (p. 23)
International and cultural diversity (p. 34)
Course for Minor

**Term Semester Credit Hours** 13
the requirements for secondary teacher certification as defined by the College of Education and Human Development (consultation with the College of Education and Human Development is required).

Program Requirements

First Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>Fall</td>
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<tr>
<td>CHEM 100</td>
<td>Horizons in Chemistry</td>
</tr>
<tr>
<td>Select one of the following:</td>
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<tr>
<td>CHEM 101 &amp; CHEM 111</td>
<td>Fundamentals of Chemistry I &amp; Fundamentals of Chemistry Laboratory I</td>
</tr>
<tr>
<td>CHEM 103 &amp; CHEM 113</td>
<td>Structure and Bonding &amp; Physical and Chemical Principles</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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<td>HIST 105</td>
<td>History of the United States</td>
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<tr>
<td>MATH 151 or MATH 171</td>
<td>Engineering Mathematics I or Analytic Geometry</td>
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<td>Chemical Education Track Elective</td>
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<tr>
<td>SCEN 201</td>
<td>Self-Directed Experiences with Adolescents</td>
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Second Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
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<td>Fall</td>
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<tr>
<td>CHEM 227</td>
<td>Organic Chemistry I</td>
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<tr>
<td>CHEM 231</td>
<td>Techniques of Organic Chemistry</td>
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<td>PHYS 218</td>
<td>Mechanics</td>
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<td>POLS 207</td>
<td>State and Local Government</td>
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<td>Chemical Education Track Elective</td>
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<tr>
<td>INST 210</td>
<td>Understanding Special Populations</td>
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Spring

<table>
<thead>
<tr>
<th>Term</th>
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<tr>
<td>CHEM 228</td>
<td>Organic Chemistry II</td>
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<td>CHEM 234</td>
<td>Organic Chemistry IV</td>
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<td>Electricity and Optics</td>
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<td>POLS 206</td>
<td>American National Government</td>
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<td>Chemical Education Track Elective</td>
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</table>

Chemistry - BA, Chemical Education Track

The chemical education track provides the student an opportunity to obtain secondary teacher certification in addition to completion of the requirements for a degree in chemistry. Many students who plan to become high school chemistry teachers or to pursue a master’s degree in chemical education will find this track attractive. Students must complete the requirements for secondary teacher certification as defined by the College of Education and Human Development (consultation with the College of Education and Human Development is required).
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Term</th>
<th>Semester Credit Hours</th>
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<td>CHEM 315</td>
<td>Quantitative Analysis</td>
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<td>CHEM 318</td>
<td>Quantitative Analysis Laboratory</td>
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<td>Physical Chemistry I</td>
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<td>INST 222 or SOCI 317</td>
<td>Foundations of Education in a Multicultural Society or Racial and Ethnic Relations</td>
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<td>Creative arts (p. 22)</td>
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<td>CHEM 317 &amp; CHEM 320</td>
<td>Quantitative Analysis &amp; Instrument Analysis Laboratory</td>
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<td>CHEM 362</td>
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<td>Chemical Biology</td>
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<td>BICH 410</td>
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<tr>
<td><strong>Spring</strong></td>
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<td>Physical Chemistry Laboratory II</td>
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<td>CHEM 481</td>
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<tr>
<td>TEFB 406</td>
<td>Science in the Middle and Secondary School</td>
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</table>
## Chemistry - BA, Environmental Chemistry Track

This environmental chemistry track contains a very large number of elective courses and provides even greater opportunity for students to select electives which provide for a career focus in environmental chemistry. The large number of electives makes it possible for students to combine interests in environmental issues with other interests such as business, law, and politics. Electives may be chosen from recommended courses in atmospheric sciences, bioenvironmental science, biology, geography, geology, geosciences, microbiology and oceanography.

### Program Requirements

#### First Year

<table>
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<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<td>CHEM 103 &amp; CHEM 113</td>
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<td>HIST 105</td>
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<td>Organic Synthesis and Analysis IV</td>
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<td>PHYS 218</td>
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<td>GEOL 104</td>
<td>Physical Geology</td>
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<td>OCNG 401</td>
<td>Interdisciplinary Oceanography</td>
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<td>OCNG 410</td>
<td>Introduction to Physical Oceanography</td>
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**Term Semester Credit Hours**

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**Course for Minor**

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**Environmental Chemistry Track Electives**

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<td>BIOL 214</td>
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<td>OCNG 420</td>
<td>Introduction to Biological Oceanography</td>
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<td>GEOL 420</td>
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<td>BESC 403</td>
<td>Sampling and Environmental Monitoring</td>
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<td>GEOG 324</td>
<td>Global Climatic Regions</td>
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<td>GEOG 330</td>
<td>Resources and the Environment</td>
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<td>GEOG 370/MARS 370</td>
<td>Coastal Processes</td>
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**Term Semester Credit Hours**

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### Second Year

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<td>CHEM 231</td>
<td>Techniques of Organic Chemistry</td>
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<td></td>
<td>ATMO 363</td>
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BIOL 111 Introductory Biology I
BIOL 112 Introductory Biology II
GEOL 104 Physical Geology
OCNG 401 Interdisciplinary Oceanography
OCNG 410 Introduction to Physical Oceanography

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<tr>
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</table>

Chemistry - BS

The BS program in Chemistry is arranged so that a student obtains a comprehensive, solid foundation in all of the major branches of chemistry, combined with a suitable measure of individual flexibility.
The latter objective is met in part by a strong emphasis on involving the undergraduate BS chemistry major in exciting, innovative, state-of-the-art research programs. Most students in the BS program become involved in research during their junior year and continue this until graduation. Students frequently receive research scholarships and fellowships, which include opportunities for summer research programs. It is not uncommon for an undergraduate chemistry major to be a coauthor of scientific publications in major research journals before graduation.

Undergraduate chemistry research activities involve substantial use of modern scientific equipment, including major instrumentation. The student involved in this activity also gains considerable insight into the profession by means of substantial individual contact with chemistry department faculty.

The BS degree in Chemistry is the appropriate program for students planning advanced degree programs in chemistry, biochemistry, forensics, chemical physics and other fields. Students planning careers in chemical industry should also choose the BS degree in Chemistry. Students may wish to choose electives suggested in the biological or environmental chemistry tracks. This degree program satisfies fully the accreditation requirements of the American Chemical Society.

### Program Requirements

#### First Year

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<td>HIST 106 History of the United States</td>
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<td>MATH 152 or MATH 172 Engineering Mathematics II or Calculus</td>
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#### Second Year

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<td>MATH 253 Mathematics III</td>
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#### Third Year

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<td>CHEM 433 Advanced Inorganic Chemistry Laboratory</td>
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<td>Select one of the following:</td>
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<tr>
<td></td>
<td>Communication (p. 20)</td>
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<tr>
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<tr>
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<td>Creative arts (p. 22)</td>
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<tr>
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<td>Social and behavioral sciences (p. 23)</td>
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<td>International and cultural diversity (p. 34)</td>
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#### Fourth Year

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<td>CHEM 415 Analytical Chemistry</td>
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Select one of the following:  

CHEM 446 Organic Chemistry III  
CHEM 456 Chemical Biology  
CHEM 462 Inorganic Chemistry  
CHEM 464 Nuclear Chemistry  
CHEM 466 Polymer Chemistry  
CHEM 470 Industrial Chemistry  
CHEM 483 Green Chemistry  
CHEM 489 Special Topics in...  
BICH 410 Comprehensive Biochemistry I  
BICH 411 Comprehensive Biochemistry II  
BICH 440 Biochemistry I  
BICH 441 Biochemistry II  
PHYS 309 Modern Physics

Select two of the following:  

Communication (p. 20)  
Language, philosophy and culture (p. 21)  
Creative arts (p. 22)  
Social and behavioral sciences (p. 23)  
International and cultural diversity (p. 34)

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<td>Seminar</td>
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<td>Research</td>
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<td>Polymer Chemistry</td>
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Select two of the following:  

Communication (p. 20)  
Language, philosophy and culture (p. 21)  
Creative arts (p. 22)  
Social and behavioral sciences (p. 23)  
International and cultural diversity (p. 34)

<table>
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<td>Geometry and Calculus</td>
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</table>

Electives recommended in the various track programs should be strongly considered.

5. The total hours of CHEM 485 and CHEM 491 taken by BS chemistry majors on a graded (A–F) basis may not exceed 15. Additional hours of these courses may be taken on a satisfactory/unsatisfactory basis.

6. Students wishing to complete an American Chemical Society certified degree program must take at least one semester of biochemistry (i.e., BICH 410 or BICH 440).

**Chemistry - BS, Biological-Chemistry Track**

The biological chemistry track has been designed for students interested in pursuing graduate study in biological chemistry, biochemistry, pharmacology or related fields or a career in the pharmaceutical industry. Students who wish to enter an MD/PhD program or medical, dental or pharmacy school will, in most cases, need to take an additional advanced biology course beyond those recommended for this track and should check the admission requirements for these programs with the Office of Professional School Advising. Courses in biology, biochemistry, genetics and statistics are recommended as electives.

**Program Requirements**

<table>
<thead>
<tr>
<th>First Year</th>
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<tbody>
<tr>
<td><strong>Fall</strong></td>
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<td>Geometry and Calculus</td>
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## Spring
Select one of the following:

- **CHEM 102** & **CHEM 112**<sup>1</sup> Fundamentals of Chemistry II and Fundamentals of Chemistry Laboratory II
- **CHEM 104** & **CHEM 114** Chemistry of the Elements and Qualitative Analysis
- **HIST 106** History of the United States<sup>2</sup>
- **MATH 152** or **MATH 172** Engineering Mathematics II or Calculus
- **PHYS 218** Mechanics

### Term Semester Credit Hours

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## Second Year

### Fall

- **CHEM 227** Organic Chemistry I<sup>1</sup>
- **CHEM 231** Techniques of Organic Chemistry
- **MATH 221** or **MATH 253** Several Variable Calculus or Engineering
- **PHYS 208** Electricity and Optics

### Term Semester Credit Hours

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<th>Hours</th>
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## Spring

- **CHEM 228** Organic Chemistry II<sup>1</sup>
- **CHEM 234** Organic Synthesis and Analysis IV<sup>3</sup>
- **CHEM 362** Descriptive Inorganic Chemistry
- Select one of the following:
  - **STAT 211** Principles of Statistics I
  - **STAT 302** Statistical Methods
- MATH course approved by chemistry advisor (p. 860)
- STAT course approved by chemistry advisor (p. 990)
- Biological Chemistry Track Elective
- **BIOL 111** Introductory Biology I

### Term Semester Credit Hours

<table>
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<th>Course Name</th>
<th>Hours</th>
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## Third Year

### Fall

- **CHEM 315** Quantitative Analysis
- **CHEM 318** Quantitative Analysis Laboratory
- **CHEM 327** Physical Chemistry I
- **CHEM 433** Advanced Inorganic Chemistry Laboratory
- **POLS 206** American National Government
- Biological Chemistry Track Elective
- **BIOL 112** Introductory Biology II

### Term Semester Credit Hours

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>16</td>
</tr>
</tbody>
</table>

## Spring

- **CHEM 325** Physical Chemistry Laboratory I
- **CHEM 328** Physical Chemistry II
- **POLS 207** State and Local Government
- Biological Chemistry Track Elective
- **GENE 301** or **GENE 320** Comprehensive Genetics or Biomedical Genetics
- Select two of the following:
  - Communication (p. 20)
  - Language, philosophy and culture (p. 21)

### Term Semester Credit Hours

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
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<td>16</td>
</tr>
</tbody>
</table>

## Fourth Year

### Fall

- **CHEM 326** Physical Chemistry Laboratory II
- **CHEM 415** Analytical Chemistry
- **CHEM 491** Research<sup>5</sup>
- Select one of the following:
  - **BICH 410** Comprehensive Biochemistry I
  - **BICH 440** Biochemistry I
  - Select two of the following:
    - Communication (p. 20)
    - Language, philosophy and culture (p. 21)
    - Creative arts (p. 22)
    - Social and behavioral sciences (p. 23)
    - International and cultural diversity (p. 34)

### Term Semester Credit Hours

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
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<td>16</td>
</tr>
</tbody>
</table>

## Spring

- **CHEM 434** Analytical Instrumentation Laboratory
- **CHEM 481** Seminar<sup>3</sup>
- **CHEM 491** Research<sup>5</sup>
- Select one of the following:
  - **BICH 411** Comprehensive Biochemistry II
  - **BICH 441** Biochemistry II
  - Select one of the following:
    - Communication (p. 20)
    - Language, philosophy and culture (p. 21)
    - Creative arts (p. 22)
    - Social and behavioral sciences (p. 23)
    - International and cultural diversity (p. 34)

### Term Semester Credit Hours

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
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## Total Semester Credit Hours:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours</th>
</tr>
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<tr>
<td></td>
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<td>120</td>
</tr>
</tbody>
</table>

<sup>1</sup> Select a section designated for chemistry majors.

<sup>2</sup> Students may substitute any 6 hours of American history courses approved by the University Core Curriculum (p. 19) to fulfill this requirement, but no more than 3 hours may be in Texas history. Students seeking teacher certification must take HIST 105 and HIST 106.

<sup>3</sup> This is a designated C- or W-course.
These electives must include 12 hours of courses which meet the language, philosophy and culture (3 hours), creative arts (3 hours), social and behavioral science (3 hours) and communication (3 hours) requirements of the University Core Curriculum (p. 19). (See page 17). In addition, 6 hours of courses must be in the area of International and Cultural Diversity (p. 34). These may be in addition to the previous 12 hours of University Core Curriculum (p. 19) courses, or if a course in this category satisfies an area of the Core, it can be used to meet both requirements. Electives should be chosen in consultation with the chemistry advisor. Electives should be chosen in consultation with the chemistry advisor and should be selected to meet the residency requirement (36 hours at 300-400 level must be taken at TAMU). Electives recommended in the various track programs should be strongly considered.

The total hours of CHEM 485 and CHEM 491 taken by BS chemistry majors on a graded (A–F) basis may not exceed 15. Additional hours of these courses may be taken on a satisfactory/unsatisfactory basis.

Chemistry - BS, Environmental Chemistry Track

Chemistry plays a major role in most environmental issues and this track recommends electives in a broad spectrum of courses designed to prepare students to address environmental problems from a variety of perspectives. Electives may be chosen from recommended courses in atmospheric sciences, bioenvironmental science, biology, geography, geology, microbiology and oceanography.

Program Requirements

First Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
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</tr>
<tr>
<td>CHEM 100 Horizons in Chemistry</td>
<td>1</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 101 Fundamentals of Chemistry I</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 111 and Fundamentals of Chemistry Laboratory I</td>
<td></td>
</tr>
<tr>
<td>CHEM 103 Structure and Bonding</td>
<td></td>
</tr>
<tr>
<td>&amp; CHEM 113 and Physical and Chemical Principles</td>
<td></td>
</tr>
<tr>
<td>ENGL 104 Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>HIST 105 History of the United States</td>
<td>3</td>
</tr>
<tr>
<td>MATH 151 or Engineering Mathematics I or Analytic</td>
<td>4</td>
</tr>
<tr>
<td>MATH 171 Geometry and Calculus</td>
<td></td>
</tr>
<tr>
<td>Term Semester Credit Hours</td>
<td>15</td>
</tr>
</tbody>
</table>

Spring

Select one of the following: | 4 |
| CHEM 102 Fundamentals of Chemistry II | |
| & CHEM 112 and Fundamentals of Chemistry Laboratory II | |
| CHEM 104 Chemistry of the Elements | |
| & CHEM 114 and Qualitative Analysis | |
| HIST 106 History of the United States | 3 |
| MATH 152 or Engineering Mathematics II or Calculus | 4 |
| MATH 172 | |
| Term Semester Credit Hours | 15 |

Second Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
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</tr>
<tr>
<td>CHEM 227 Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 231 Techniques of Organic Chemistry</td>
<td>2</td>
</tr>
<tr>
<td>MATH 221 or Several Variable Calculus or Engineering</td>
<td>4</td>
</tr>
<tr>
<td>MATH 253 Mathematics III</td>
<td></td>
</tr>
<tr>
<td>PHYS 208 Electricity and Optics</td>
<td>4</td>
</tr>
<tr>
<td>Term Semester Credit Hours</td>
<td>13</td>
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</tbody>
</table>

Spring

CHEM 228 Organic Chemistry II | 3 |
CHEM 234 Organic Synthesis and Analysis IV | 3 |
CHEM 362 Descriptive Inorganic Chemistry | 3 |
Select one of the following: | 3 |
| MATH 304 Linear Algebra | |
| MATH 308 Differential Equations | |
| STAT 211 Principles of Statistics I | |
| MATH course approved by chemistry advisor (p. 860) | |
| STAT course approved by chemistry advisor (p. 990) | |
| Environmental Chemistry Track Elective | |
| Select one of the following: | 3 |
| ATMO 363 Introduction to Atmospheric Chemistry and Air Pollution | |
| BIOL 111 Introductory Biology I | |
| BIOL 112 Introductory Biology II | |
| GEOL 104 Physical Geology | |
| OCNG 401 Interdisciplinary Oceanography | |
| OCNG 410 Introduction to Physical Oceanography | |
| Term Semester Credit Hours | 15 |

Third Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
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</tr>
<tr>
<td>CHEM 315 Quantitative Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 318 Quantitative Analysis Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 327 Physical Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 433 Advanced Inorganic Chemistry Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>POLS 206 American National Government</td>
<td>3</td>
</tr>
<tr>
<td>Environmental Chemistry Track Elective</td>
<td></td>
</tr>
<tr>
<td>Select one of the following:</td>
<td>3</td>
</tr>
<tr>
<td>ATMO 363 Introduction to Atmospheric Chemistry and Air Pollution</td>
<td></td>
</tr>
<tr>
<td>BIOL 111 Introductory Biology I</td>
<td></td>
</tr>
<tr>
<td>BIOL 112 Introductory Biology II</td>
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<tr>
<td>GEOL 104 Physical Geology</td>
<td></td>
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<td>OCNG 401 Interdisciplinary Oceanography</td>
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<tr>
<td>OCNG 410 Introduction to Physical Oceanography</td>
<td></td>
</tr>
<tr>
<td>Term Semester Credit Hours</td>
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</tr>
</tbody>
</table>

Spring

CHEM 325 Physical Chemistry Laboratory I | 1 |
CHEM 328 Physical Chemistry II | 3 |
POLS 207 State and Local Government | 3 |
Environmental Chemistry Track Elective | |
Select two of the following:

- BESC 403 Sampling and Environmental Monitoring
- BIOL 214 Genes, Ecology and Evolution
- GEOG 324 Global Climatic Regions
- GEOG 330 Resources and the Environment
- GEOG 370/MARS 370 Coastal Processes
- GEOL 420 Environmental Geology
- GEOL 451 Introduction to Geochemistry
- OCNG 420 Introduction to Biological Oceanography

Select one of the following:

- Communication
- Language, philosophy and culture
- Creative arts
- Social and behavioral sciences
- International and cultural diversity

**Fourth Year**

**Term Semester Credit Hours**

**Fall**

- CHEM 326 Physical Chemistry Laboratory II 1
- CHEM 415 Analytical Chemistry 3
- CHEM 491 Research 5

Select two of the following:

- CHEM 446 Organic Chemistry III
- CHEM 456 Chemical Biology
- CHEM 462 Inorganic Chemistry
- CHEM 464 Nuclear Chemistry
- CHEM 466 Polymer Chemistry
- CHEM 470 Industrial Chemistry
- CHEM 483 Green Chemistry
- CHEM 489 Special Topics in...
- BICH 410 Comprehensive Biochemistry I
- BICH 411 Comprehensive Biochemistry II
- BICH 440 Biochemistry I
- BICH 441 Biochemistry II
- PHYS 309 Modern Physics

Select two of the following:

- Communication
- Language, philosophy and culture
- Creative arts
- Social and behavioral sciences
- International and cultural diversity

**Spring**

- CHEM 434 Analytical Instrumentation Laboratory 2
- CHEM 481 Seminar 3
- CHEM 491 Research 5

Select one of the following:

- CHEM 446 Organic Chemistry III
- CHEM 456 Chemical Biology
- CHEM 462 Inorganic Chemistry

**Term Semester Credit Hours**

**Spring**

- CHEM 485 6
- CHEM 491 3

Select a section designated for chemistry majors.

- Students may substitute any 6 hours of American history courses approved by the University Core Curriculum to fulfill this requirement, but no more than 3 hours may be in Texas history.
- Students seeking teacher certification must take HIST 105 and HIST 106.

- This is a designated C-pr W-course.

- These electives must include 12 hours of courses which meet the language, philosophy and culture (3 hours), creative arts (3 hours), social and behavioral science (3 hours) and communication (3 hours) requirements of the University Core Curriculum. These may be in addition to the previous 12 hours of University Core Curriculum courses, or if a course in this category satisfies an area of the Core, it can be used to meet both requirements.

- Electives recommended in the various track programs should be strongly considered.

- The total hours of CHEM 485 and CHEM 491 taken by BS chemistry majors on a graded (A–F) basis may not exceed 15. Additional hours of these courses may be taken on a satisfactory/unsatisfactory basis.

- Students wishing to complete an American Chemical Society certified degree program must take at least one semester of biochemistry (i.e., BICH 410 or BICH 440).

**Chemistry - Minor**

Students seeking a minor in chemistry must complete the Declaration of Minor in Chemistry form and have it approved by the undergraduate advisor in chemistry (Room 104 Chemistry) and their academic advisor.

A minor in Chemistry should represent course work taken in the discipline beyond courses that might be used to satisfy core curriculum science requirements. Therefore, though CHEM 101/CHEM 111 or CHEM 107 and CHEM 102/CHEM 112 are prerequisites to all of the
listed courses, they are not considered part of the minor program. The course work listed (17-20 credits) represents various sub-disciplines within the field of Chemistry and would give the student an overall knowledge base fitting a Minor in Chemistry. This is consistent with the statement on minors published by the American Chemical Society.

Program Requirements

The student will choose FIVE lecture courses (14-15 credits) and THREE laboratory courses (3-5 credits) from categories A.-E. below. The student must take at least one course from FOUR of the FIVE categories. Students must have a C average in all courses taken for a minor in Chemistry. CHEM 491 and CHEM 485 credits will not be allowed to count for the minor nor used in the Chemistry GPA calculation. Substitution of courses without the CHEM prefix will not be allowed.

NOTE: Students following the Fall 2008 catalog or earlier should follow the pre Catalog 132 requirements (http://www.chem.tamu.edu/academics/undergraduate/minors_pre132.php).

A. Organic Chemistry

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tr>
<td>CHEM 227</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 237</td>
<td>Organic Chemistry Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 228</td>
<td>Organic Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 238</td>
<td>Organic Chemistry Laboratory</td>
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</tbody>
</table>

B. Analytical Chemistry

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 315</td>
<td>Quantitative Analysis 1</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 316</td>
<td>Quantitative Analysis 1</td>
<td>2</td>
</tr>
<tr>
<td>CHEM 317</td>
<td>Quantitative Analysis</td>
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</tr>
<tr>
<td>CHEM 318</td>
<td>Quantitative Analysis Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 320</td>
<td>Instrumental Analysis Laboratory</td>
<td>2</td>
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</tbody>
</table>

C. Physical Chemistry

<table>
<thead>
<tr>
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<th>Credits</th>
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<tbody>
<tr>
<td>CHEM 322</td>
<td>Physical Chemistry for Engineers 2</td>
<td>3</td>
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<td>CHEM 325</td>
<td>Physical Chemistry Laboratory I</td>
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<tr>
<td>CHEM 326</td>
<td>Physical Chemistry Laboratory II</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 327</td>
<td>Physical Chemistry I 2</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 328</td>
<td>Physical Chemistry II</td>
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</table>

D. Inorganic Chemistry

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tr>
<td>CHEM 362</td>
<td>Descriptive Inorganic Chemistry</td>
<td>3</td>
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<tr>
<td>CHEM 383</td>
<td>Chemistry of Environmental Pollution</td>
<td>3</td>
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E. Advanced Chemistry

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CHEM 415</td>
<td>Analytical Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 433</td>
<td>Advanced Inorganic Chemistry Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>CHEM 434</td>
<td>Analytical Instrumentation Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>CHEM 446</td>
<td>Organic Chemistry III</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 456</td>
<td>Chemical Biology</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 462</td>
<td>Inorganic Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 464</td>
<td>Nuclear Chemistry</td>
<td>3</td>
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<tr>
<td>CHEM 466</td>
<td>Polymer Chemistry</td>
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<tr>
<td>CHEM 470</td>
<td>Industrial Chemistry</td>
<td>3</td>
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<td>CHEM 483</td>
<td>Green Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 489</td>
<td>Special Topics in...</td>
<td>1-4</td>
</tr>
</tbody>
</table>

1 Students may not count both CHEM 315 and CHEM 316
2 Students may not count both CHEM 322 and CHEM 327

Department of Mathematics

The Department of Mathematics offers curricula which lead to the following undergraduate degrees: Bachelor of Science in Applied Mathematical Sciences, Bachelor of Arts in Mathematics and Bachelor of Science in Mathematics. An Integrated Fast Track combined baccalaureate/graduate degree program is also offered.

The curriculum for the BS in Applied Mathematical Sciences includes courses in economics, industrial engineering, statistics, computer science and mathematics. A student completing this program is prepared to enter employment with analytical and quantitative tools relevant to modern technological industries and/or modern financial markets. On the other hand, with the appropriate electives chosen, the student is prepared to enter quantitatively oriented graduate programs. Advising for this degree option is done through the Undergraduate Program Office in the Department of Mathematics.

With carefully chosen electives in education, any one of the above three degree plans can lead to teacher certification. Students interested in teacher certification may find the BA degree plan the most suitable since this degree plan offers the greatest flexibility for the inclusion of teacher certification courses.

Faculty

Allen, Angela J, Instructional Assistant Professor
Mathematics
MS, Texas A&M University, 2005

Allen, Graham D, Professor
Mathematics
PhD, University of Wisconsin-Madison, 1971
MS, University of Wisconsin, 1966

Anshelevich, Michael V, Professor
Mathematics
PhD, University of California, Berkeley, 2000

Arora, Rashi, Lecturer
Mathematics
MS, Texas A&M University, 2011

Aurispa, Benjamin, Instructional Assistant Professor
Mathematics
MS, Texas A&M University, 2006

Austin, Amy L, Instructional Assistant Professor
Mathematics
MS, Texas A&M University, 1994

Avsec, Stephen T, Visiting Assistant Professor
Mathematics
PhD, University of Illinois, 2012

Bangerth, Wolfgang, Professor
Mathematics
PhD, University of Heidelberg, Germany, 2002

Baskin, Dean R, Assistant Professor
Mathematics
PhD, Stanford University, 2010
Battle, Guy A, Professor
Mathematics
PhD, Duke University, 1977

Baudier, Florent P, Visiting Assistant Professor
Mathematics
PhD, Universite Franche-Comte, 2009

Belmonte, Arthur P, Instructional Assistant Professor
Mathematics
MS, Texas A&M University, 1986

Berkolaiko, Gregory, Professor
Mathematics
PhD, Duke University, 1977

Borosh, Itshak, Senior Professor
Mathematics
PhD, Weizmann Institute of Science, 1966

Bonito, Andrea, Professor
Mathematics
PhD, Ecole Polytechnique Federale de Lausanne, 2006

Borosh, Itshak, Senior Professor
Mathematics
PhD, Weizmann Institute of Science, 1966

Brannan, Michael P, Assistant Professor
Mathematics
PhD, Queen's University, 2006

Cacic, Branimir J, Visiting Assistant Professor
Mathematics
PhD, California Institute of Technology, 2013

Carter, Tamara A, Instructional Assistant Professor
Mathematics
PhD, Texas A&M University, 2005

Chang, Liang, Visiting Assistant Professor
Mathematics
PhD, University of California, Santa Barbara, 2013

Chen, Goong, Professor
Mathematics
PhD, University of Wisconsin-Madison, 1977

Comech, Andrew, Associate Professor
Mathematics
PhD, Columbia University, 1997

Daripa, Prabir, Associate Professor
Mathematics
PhD, Brown University, 1985

DeVore, Ronald A, Distinguished Professor
Mathematics
PhD, Ohio State University, 1967

Demlow, Alan R, Associate Professor
Mathematics
PhD, Cornell University, 2002

Douglas, Ronald G, Distinguished Professor
Mathematics
PhD, Louisiana State University, 1962

Drost, Marcia, Senior Lecturer
Mathematics
MNS, Arizona State University, 1972

Dykema, Kenneth J, Professor
Mathematics
PhD, University of California, Berkeley, 1993

Efendiev, Yalchin R, Professor
Mathematics
PhD, California Institute of Technology, 1999

Epstein, Janice L, Instructional Associate Professor
Mathematics
PhD, Texas A&M University, 1992

Erdelyi, Tamas, Professor
Mathematics
PhD, University of South Carolina, 1989

Foias, Ciprian I, Distinguished Professor
Mathematics
PhD, University of Bucharest, 1968

Forsgaard, Jens B, Visiting Assistant Professor
Mathematics
PhD, Stockholm University, 2015

Fry, Erin K, Lecturer
Mathematics
MS, University of Illinois at Urbana-Champaign, 1990

Fulling, Stephen A, Professor
Mathematics
PhD, Princeton University, 1972

Geller, Susan C, Professor
Mathematics
PhD, Cornell University, 1975

Grigorchuk, Rostislav, Distinguished Professor
Mathematics
PhD, Moscow State University, 1978

Guermond, Jean-Luc, Professor
Mathematics
MS, Moscow State University of Lomonosov, 1975

Gustafson, Robert A, Associate Professor
Mathematics
PhD, Yale University, 1979
Harris, Isaac, Visiting Assistant Professor
Mathematics
PhD, University of Delaware, 2015

Hester, Yvette C, Instructional Associate Professor
Mathematics
PhD, Texas A&M University, 2000

Howard, Peter B, Professor
Mathematics
PhD, Indiana University, 1998

Ikenmeyer, Christian, Visiting Assistant Professor
Mathematics
PhD, Universitat Paderborn, Germany, 2012

Johnson, William B, Distinguished Professor
Mathematics
PhD, Iowa State University, 1969

Kahlig, Joseph E, Instructional Assistant Professor
Mathematics
MS, Texas A&M University, 1994

Kerr, David G, Professor
Mathematics
PhD, University of Toronto, 2001

Kilfe, Thomas R, Associate Professor
Mathematics
PhD, University of Wisconsin-Madison, 1975

Kilmer, Kendra R, Instructional Assistant Professor
Mathematics
MS, Texas A&M University, 2003

Kim, JoungDong, Instructional Assistant Professor
Mathematics
PhD, State University of New York at Stony Brook, 2012

Kiral, Eren M, Visiting Assistant Professor
Mathematics
PhD, Brown University, 2014

Klein, Gregory S, Instructional Assistant Professor
Mathematics
MS, Texas A&M University, 1992

Kuchment, Peter, Distinguished Professor
Mathematics
PhD, Kharkov State University, Russia, 1973

Lahodny, Glenn E, Instructional Assistant Professor
Mathematics
PhD, Texas Tech University, 2012

Landsberg, Joseph M, Professor
Mathematics
PhD, Duke University, 1990

Larson, David R, Professor
Mathematics
PhD, University of California, Berkeley, 1976

Lazarov, Raytcho D, Professor
Mathematics
PhD, University of Moscow, Russia, 1972

Lee, Sang Rae, Visiting Assistant Professor
Mathematics
PhD, University of Oklahoma, 2012

Lewis, Jennifer L, Lecturer
Mathematics
PhD, Ohio State University, 1980
MS, Ohio State University, 1979

Lima-Filho, Paulo C, Professor
Mathematics
PhD, State University of New York at Stony Brook, 1989

Lozovskiy, Alexander V, Visiting Assistant Professor
Mathematics
PhD, University of Pittsburgh, 2010

Lynch, Benjamin, Lecturer
Mathematics
PhD, University of Tennessee, 2010

Manuel, David J, Instructional Assistant Professor
Mathematics
MS, Texas A&M University, 1994

Masri, Mohamad R, Associate Professor
Mathematics
PhD, University of Texas, Austin, 2005

Matusevich, Laura F, Associate Professor
Mathematics
PhD, University of California, Berkeley, 2002

Mogilevsky, Mila, Instructional Assistant Professor
Mathematics
PhD, Rostov State University USSR, 1977

Motakis, Pavlos, Visiting Assistant Professor
Mathematics
PhD, National Technical University of Athens, 2015

Narcowich, Francis J, Professor
Mathematics
PhD, Princeton University, 1972

Nekrashevych, Volodymyr, Professor
Mathematics
PhD, Taras Shevchenko National University, Russia, 1998

Oneill, Christopher D, Visiting Assistant Professor
Mathematics
PhD, Duke University, 2014

Onica, Constantin, Instructional Assistant Professor
Mathematics
PhD, Texas A&M University, 2005

Paouris, Grigoris, Professor
Mathematics
PhD, University of Crete, 2004
Papanikolas, Matthew A, Professor
Mathematics
PhD, Brown University, 1998

Pasciak, Joseph E, Professor
Mathematics
PhD, Northeastern University, 1997

Pearlstein, Gregory J, Associate Professor
Mathematics
PhD, University of Massachusetts, 1999

Pearlstein, Rosanna, Lecturer
Mathematics
MS, University of Massachusetts, 1998

Petrova, Guergana P, Professor
Mathematics
PhD, University of South Carolina, 1999

Pilant, Michael S, Professor
Mathematics
PhD, New York University, 1982

Pisier, Gilles, Distinguished Professor
Mathematics
PhD, University of Paris, 1977

Pitts, Jon T, Professor
Mathematics
PhD, Princeton University, 1974

Plavnik, Julia, Visiting Assistant Professor
Mathematics
PhD, Universidad Nacional de Cordoba, 2013

Pollock, Sara N, Visiting Assistant Professor
Mathematics
PhD, University of California, San Diego, 2012

Poltoratski, Alexei G, Professor
Mathematics
PhD, California Institute of Technology, 1995

Popov, Bojan D, Professor
Mathematics
PhD, University of Southern Carolina, 1999

Procaccia, Eviatar B, Assistant Professor
Mathematics
PhD, Hebrew University of Jerusalem, 2007

Ramsey, Heather L, Instructional Assistant Professor
Mathematics
MS, Texas A&M University, 2004

Reihani, Kamran, Instructional Assistant Professor
Mathematics
PhD, Tarbiat Modares University, 2005

Robles, Colleen M, Professor
Mathematics
PhD, UNIVERSITY OF BRITISH COLUMBIA, 2003

Rojas, Joseph M, Professor
Mathematics
PhD, University of California, Berkeley, 1995

Roque-Sol, Marco A, Lecturer
Mathematics
PhD, Texas A&M University, 2006

Rowell, Eric C, Associate Professor
Mathematics
PhD, University of California, San Diego, 2003

Rundell, William, Professor
Mathematics
PhD, Glasgow University, 1974

Scarborough, Sherry L, Instructional Assistant Professor
Mathematics
PhD, Texas A&M University, 2001

Schielack, Jane F, Professor
Mathematics
PhD, Texas A&M University, 1988

Schielack, Vincent, Associate Professor
Mathematics
PhD, University of Texas, Austin, 1982

Schlumprecht, Thomas B, Professor
Mathematics
PhD, Ludwig Maximilians Universitat, Germany, 1988

Sengupta, Sinjini, Lecturer
Mathematics
MMA, Florida State University, 2006

Shatalov, Oksana, Instructional Assistant Professor
Mathematics
PhD, Technion - Israel Institute of Technology, 2001

Shiu, Anne J, Assistant Professor
Mathematics
PhD, University of California, Berkeley, 2010

Sivakumar, Natarajan, Associate Professor
Mathematics
PhD, University of Alberta, 1990

Skoufranis, Paul D, Visiting Assistant Professor
Mathematics
PhD, University of California, Los Angeles, 2014

Smith, Roger R, Professor
Mathematics
PhD, University of Oxford, 1976

Sottile, Frank J, Professor
Mathematics
PhD, University of Chicago, 1994

Stecher, Michael J, Associate Professor
Mathematics
PhD, Indiana University, 1973
Stiller, Peter F, Professor
Mathematics
PhD, Princeton University, 1977

Straube, Emil J, Professor
Mathematics
PhD, Swiss Federal Institute of Technology, Zurich, 1983

Sunik, Zoran, Professor
Mathematics
PhD, Binghamton University, 2000

Takhirov, Aziz, Visiting Assistant Professor
Mathematics
PhD, University of Pittsburgh, 2014

Taliaferro, Steven D, Associate Professor
Mathematics
PhD, Stanford University, 1976

Titi, Edriss S, Professor
Mathematics
PhD, Indiana University, 1986

Tomas, Ignacio, Visiting Assistant Professor
Mathematics
PhD, University of Maryland, 2012

Tretkoff, Paula, Professor
Mathematics
PhD, University of Nottingham, 1985

Tucker-Drob, Robin, Assistant Professor
Mathematics
PhD, California Institute of Technology, 2013

Turcksin, Bruno, Visiting Assistant Professor
Mathematics
PhD, Texas A&M University, 2012

Vogel, Thomas I, Associate Professor
Mathematics
PhD, Stanford University, 1981

Vorobets, Mariya, Instructional Assistant Professor
Mathematics
PhD, Lviv National University, 2004

Vorobets, Yaroslav, Associate Professor
Mathematics
PhD, Moscow State University, 1998

Walton, Jay R, Professor
Mathematics
PhD, Indiana University, 1973

Ward, Joseph D, Professor
Mathematics
PhD, Purdue University, 1973

Welper, Gerrit, Visiting Assistant Professor
Mathematics
PhD, RWTH Aachen University, 2013

Whitfield, Jennifer G, Instructional Assistant Professor
Mathematics
MS, Texas A&M University, 2000

Witherspoon, Sarah J, Professor
Mathematics
PhD, University of Chicago, 1994

Xie, Zhizhang, Assistant Professor
Mathematics
PhD, Ohio State University, 2011

Yan, Huafei, Professor
Mathematics
PhD, Massachusetts Institute of Technology, 1997

Yasskin, Philip B, Associate Professor
Mathematics
PhD, University of Maryland, 1979

Young, Matthew P, Professor
Mathematics
PhD, Rutgers University, 2004

Yu, Guoliang, Professor
Mathematics
PhD, State University Of New York at Stony Brook, 1991

Zelenko, Igor, Associate Professor
Mathematics
PhD, Technion - Israel Institute of Technology, 2002

Zhang, Zheng, Visiting Assistant Professor
Mathematics
PhD, Stony Brook University, 2014

Zhou, Jianxin, Professor
Mathematics
PhD, Pennsylvania State University, 1986

Zinn, Joel, Professor
Mathematics
PhD, Universit of Wisconsin - madison, 1972

de Wolff, Timo, Visiting Assistant Professor
Mathematics
PhD, Goethe Universitat, 2013

**Majors**

- Bachelor of Arts in Mathematics (p. 559)
- Bachelor of Science in Mathematics (p. 560)
- Bachelor of Science in Applied Mathematical Sciences, Actuarial Emphasis (p. 551)
- Bachelor of Science in Applied Mathematical Sciences, Biological Science Emphasis (p. 552)
- Bachelor of Science in Applied Mathematical Sciences, Computational Emphasis (p. 553)
- Bachelor of Science in Applied Mathematical Sciences, Economics Emphasis (p. 555)
- Bachelor of Science in Applied Mathematical Sciences, Math Emphasis (p. 556)
Minors

- Mathematics Minor (p. 561)

Applied Mathematical Sciences - BS, Actuarial Emphasis

Many advances in technology and business are achieved by people applying technical knowledge from statistics, computing science, finance, economics and mathematics. The curriculum in applied mathematical sciences provides study in all of these areas, with ample electives available to allow further in-depth study of any of these areas. In fact, there are six emphases in this curriculum: Applied Mathematics, Statistics, Actuarial Science, Economics, Biological Science and Scientific Computing. The Actuarial Science emphasis includes mathematical finance.

A student completing this program is prepared to enter employment with analytical and quantitative tools relevant to technological industries and/ or modern financial markets. On the other hand, with the appropriate electives chosen, the student is prepared to enter quantitatively oriented graduate schools. All advising for this degree option is done through the Undergraduate Program Office in the Department of Mathematics.

Program Requirements

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<tr>
<th>First Year</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>Fall</td>
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<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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<td>MATH 170</td>
<td>Freshman Mathematics Laboratory</td>
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<tr>
<td>MATH 171</td>
<td>Analytic Geometry and Calculus</td>
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<tr>
<td>CSCE 110</td>
<td>Programming I</td>
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<tr>
<td>CSCE 111</td>
<td>Introduction to Computer Science Concepts and Programming</td>
</tr>
<tr>
<td>CSCE 121</td>
<td>Introduction to Program Design and Concepts</td>
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<td>CSCE 206</td>
<td>Structured Programming in C</td>
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<td>BIOL 111</td>
<td>Introductory Biology I</td>
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<tr>
<td>BIOL 112</td>
<td>Introductory Biology II</td>
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<td>CHEM 101 &amp; CHEM 111</td>
<td>Fundamentals of Chemistry I</td>
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<td>CHEM 102 &amp; CHEM 112</td>
<td>Fundamentals of Chemistry II</td>
</tr>
<tr>
<td>CHEM 103 &amp; CHEM 113</td>
<td>Structure and Bonding and Physical and Chemical Principles</td>
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<tr>
<td>CHEM 104 &amp; CHEM 114</td>
<td>Chemistry of the Elements and Qualitative Analysis</td>
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<tr>
<td>ASTR 111</td>
<td>Overview of Modern Astronomy</td>
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<tr>
<td>ECON 202 or ECON 203</td>
<td>Principles of Economics or Principles of Economics</td>
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<td>HIST 106</td>
<td>History of the United States</td>
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<td>MATH 220</td>
<td>Foundations of Mathematics</td>
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<td>MATH 221</td>
<td>Several Variable Calculus</td>
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<td>STAT 211</td>
<td>Principles of Statistics I</td>
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<tr>
<td>MATH 308</td>
<td>Differential Equations</td>
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<tr>
<td>MATH 323</td>
<td>Linear Algebra</td>
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<td>POLS 206</td>
<td>American National Government</td>
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<td>STAT 212</td>
<td>Principles of Statistics II</td>
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<td>Language, philosophy and culture (p. 21)</td>
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<tr>
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<tr>
<td>MATH 325</td>
<td>The Mathematics of Interest</td>
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<tr>
<td>MATH 411 or STAT 414</td>
<td>Mathematical Probability or Mathematical Statistics I</td>
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<tr>
<td>MATH 425</td>
<td>The Mathematics of Contingent Claims</td>
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<td>Communication (p. 20)</td>
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<td>Elective 3</td>
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<tbody>
<tr>
<td>MATH 417 or MATH 437</td>
<td>Numerical Methods or Principles of Numerical Analysis</td>
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<td>Course Code</td>
<td>Course Title</td>
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<tr>
<td>-------------</td>
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<tr>
<td>PHYS 208 or OCNG 451</td>
<td>Electricity and Optics or Mathematical Modeling of Ocean Climate</td>
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<td>MATH 419</td>
<td>Applications of Actuarial Science</td>
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<tr>
<td>Elective 3</td>
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**Fourth Year**

**Fall**

Select six hours from the following:
- MATH 407-MATH 489
- STAT 407-STAT 415
- CSCE 210-CSCE 499
- ISEN 420-ISEN 421

Select nine hours from the following:
- ECON 311-ECON 489
- FINC 309-FINC 489

**Spring**

- MATH 409 Advanced Calculus I
- POLS 207 State and Local Government
- PHYS 218 Mechanics
- Creative arts (p. 22)

Select one of the following:
- ECON 311-ECON 489
- FINC 309-FINC 489

**Term Semester Credit Hours**

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
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<tr>
<td>Fall</td>
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<tr>
<td>Spring</td>
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</table>

**Total Semester Credit Hours:** 120

---

1. Select 3 hours from any 200-400 level course.
2. MATH 411 should be taken the semester after taking MATH 221.
3. Three elective hours must be chosen from the approved University Core Curriculum (p. 19) list for creative arts. In addition, 6 hours of courses must be in the area of International and Cultural Diversity (p. 34). These may be in addition to University Core Curriculum (p. 19) courses, or if a course in this category satisfies an area of the Core, it can be used to meet both requirements. Students desiring teacher certification should consult the requirements for certification before registering for electives.
4. Except CSCE 442.

If a grade of D or F is earned in any of the following courses, MATH 151/MATH 171, MATH 152/MATH 172, MATH 221/MATH 251/MATH 253, MATH 220, MATH 323 or MATH 308, this course must be immediately retaken and a grade of C or better earned. The department will allow at most two D's in upper-level (325-499) courses. If a third D is earned, one of the three courses in which a D was earned must be retaken and a grade of C or better earned.

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**Applied Mathematical Sciences - BS, Biological Science Emphasis**

Many advances in technology and business are achieved by people applying technical knowledge from statistics, computing science, finance, economics and mathematics. The curriculum in applied mathematical sciences provides study in all of these areas, with ample electives available to allow further in-depth study of any of these areas. In fact, there are six emphases in this curriculum: Applied Mathematics, Statistics, Actuarial Science, Economics, Biological Science and Scientific Computing. The Actuarial Science emphasis includes mathematical finance.

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**Program Requirements**

**Biological Science Emphasis:** Consult with departmental advisor.

**First Year**

**Fall**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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</tr>
<tr>
<td>MATH 170</td>
<td>Freshman Mathematics Laboratory</td>
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</tr>
<tr>
<td>MATH 171</td>
<td>Analytic Geometry and Calculus</td>
<td>4</td>
</tr>
</tbody>
</table>

Select one of the following:
- CSCE 110 Programming I
- CSCE 111 Introduction to Computer Science Concepts and Programming
- CSCE 121 Introduction to Program Design and Concepts
- CSCE 206 Structured Programming in C

**Spring**

- HIST 105 History of the United States
- MATH 170 Freshman Mathematics Laboratory
- MATH 172 Calculus

Select one of the following:
- BIOL 111 Introductory Biology I
- BIOL 112 Introductory Biology II
- CHEM 101 Fundamentals of Chemistry I
- CHEM 111 and Fundamentals of Chemistry Laboratory I
- CHEM 102 Fundamentals of Chemistry II
- CHEM 112 and Fundamentals of Chemistry Laboratory II
- CHEM 103 Structure and Bonding
- CHEM 113 and Physical and Chemical Principles
- CHEM 104 Chemistry of the Elements
- CHEM 114 and Qualitative Analysis
- ASTR 111 Overview of Modern Astronomy

**Term Semester Credit Hours**

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>Fall</td>
<td>16</td>
</tr>
<tr>
<td>Spring</td>
<td>16</td>
</tr>
</tbody>
</table>

---

1. Select 3 hours from any 200-400 level course.
2. MATH 411 should be taken the semester after taking MATH 221.
3. Three elective hours must be chosen from the approved University Core Curriculum (p. 19) list for creative arts. In addition, 6 hours of courses must be in the area of International and Cultural Diversity (p. 34). These may be in addition to University Core Curriculum (p. 19) courses, or if a course in this category satisfies an area of the Core, it can be used to meet both requirements. Students desiring teacher certification should consult the requirements for certification before registering for electives.
4. Except CSCE 442.
CHEM 101  Fundamentals of Chemistry I
& CHEM 111  and Fundamentals of Chemistry Laboratory I
CHEM 102  Fundamentals of Chemistry II
& CHEM 112  and Fundamentals of Chemistry Laboratory II
CHEM 103  Structure and Bonding
& CHEM 113  and Physical and Chemical Principles
CHEM 104  Chemistry of the Elements
& CHEM 114  and Qualitative Analysis
ASTR 111  Overview of Modern Astronomy

Term Semester Credit Hours 16

Second Year
Fall
ECON 202 or Principles of Economics or Principles of Economics 3
ECON 203  3
HIST 106  History of the United States 3
MATH 220  Foundations of Mathematics 3
MATH 221  Several Variable Calculus 4
STAT 211  Principles of Statistics I 3

Term Semester Credit Hours 16

Spring
MATH 308  Differential Equations 3
MATH 323  Linear Algebra 3
POLS 206  American National Government 3
STAT 212  Principles of Statistics II 3
Language, philosophy and culture (p. 21) 3

Term Semester Credit Hours 15

Third Year
Fall
MATH 409  Advanced Calculus I 3
POLS 207  State and Local Government 3
PHYS 218  Mechanics 4
Consult with departmental advisor to select emphasis hours. 3
Elective hours 3

Term Semester Credit Hours 16

Spring
MATH 417 or Numerical Methods or Principles of 4
MATH 437  Numerical Analysis 4
PHYS 208 or Electricity and Optics or Mathematical 4
OCNG 451  Modeling of Ocean Climate 4
Consult with departmental advisor to select emphasis hours. 3
Elective hours 4

Term Semester Credit Hours 15

Fourth Year
Fall
Select one of the following: 3
COMM 203  Public Speaking
COMM 205  Communication for Technical Professions
COMM 243  Argumentation and Debate
Consult with departmental advisor to select emphasis hours 9

Term Semester Credit Hours 12

Spring
Consult with departmental advisor to select emphasis hours 9
Elective hours 5

Term Semester Credit Hours 14

Total Semester Credit Hours: 120

1  Select 3 hours from any 200-400 level course.
2  Three elective hours must be chosen from the approved University Core Curriculum (p. 19) list for creative arts. In addition, 6 hours of courses must be in the area of International and Cultural Diversity (p. 34). These may be in addition to University Core Curriculum (p. 19) courses, or if a course in this category satisfies an area of the Core, it can be used to meet both requirements. Students desiring teacher certification should consult the requirements for certification before registering for electives.

If a grade of D or F is earned in any of the following courses, MATH 151/MATH 171, MATH 152/MATH 172, MATH 221/MATH 251/MATH 253, MATH 220, MATH 323 or MATH 308, this course must be immediately retaken and a grade of C or better earned. The department will allow at most two D's in upper-level (325-499) courses. If a third D is earned, one of the three courses in which a D was earned must be retaken and a grade of C or better earned.

Applied Mathematical Sciences - BS, Computational Emphasis

Many advances in technology and business are achieved by people applying technical knowledge from statistics, computing science, finance, economics and mathematics. The curriculum in applied mathematical sciences provides study in all of these areas, with ample electives available to allow further in-depth study of any of these areas. In fact, there are six emphases in this curriculum: Applied Mathematics, Statistics, Actuarial Science, Economics, Biological Science and Scientific Computing. The Actuarial Science emphasis includes mathematical finance.

A student completing this program is prepared to enter employment with analytical and quantitative tools relevant to technological industries and/or modern financial markets. On the other hand, with the appropriate electives chosen, the student is prepared to enter quantitatively oriented graduate schools. All advising for this degree option is done through the Undergraduate Program Office in the Department of Mathematics.

Program Requirements

First Year
Fall
Semester Credit Hours
ENGL 104  Composition and Rhetoric 3
MATH 170  Freshman Mathematics Laboratory 1
MATH 171  Analytic Geometry and Calculus 4
Select one of the following: 4
CSCE 110  Programming I
CSCE 111  Introduction to Computer Science Concepts and Programming
CSCE 121  Introduction to Program Design and Concepts
CSCE 206  Structured Programming in C

Spring

Term Semester Credit Hours 15
Select one of the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
</tr>
<tr>
<td>BIOL 112</td>
<td>Introductory Biology II</td>
</tr>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
</tr>
<tr>
<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
</tr>
<tr>
<td>CHEM 102</td>
<td>Fundamentals of Chemistry II</td>
</tr>
<tr>
<td>&amp; CHEM 112</td>
<td>and Fundamentals of Chemistry Laboratory II</td>
</tr>
<tr>
<td>CHEM 103</td>
<td>Structure and Bonding</td>
</tr>
<tr>
<td>&amp; CHEM 113</td>
<td>and Physical and Chemical Principles</td>
</tr>
<tr>
<td>CHEM 104</td>
<td>Chemistry of the Elements</td>
</tr>
<tr>
<td>&amp; CHEM 114</td>
<td>and Qualitative Analysis</td>
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<tr>
<td>ASTR 111</td>
<td>Overview of Modern Astronomy</td>
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| Term Semester Credit Hours | 4 |

### Second Year

#### Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>ECON 202 or</td>
<td>Principles of Economics or Principles of</td>
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<tr>
<td>ECON 203</td>
<td>Economics</td>
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<tr>
<td>HIST 106</td>
<td>History of the United States</td>
<td>3</td>
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<tr>
<td>MATH 220</td>
<td>Foundations of Mathematics</td>
<td>3</td>
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<tr>
<td>MATH 221</td>
<td>Several Variable Calculus</td>
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</tr>
<tr>
<td>STAT 211</td>
<td>Principles of Statistics I</td>
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| Term Semester Credit Hours | 16 |

#### Spring

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<td>Linear Algebra</td>
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<td>POLS 206</td>
<td>American National Government</td>
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| Term Semester Credit Hours | 16 |

### Third Year

#### Fall

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<td>POLS 207</td>
<td>State and Local Government</td>
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<tr>
<td>PHYS 218</td>
<td>Mechanics</td>
<td>4</td>
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<tr>
<td>MATH 415 or</td>
<td>Modern Algebra I or Applied Algebra</td>
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<td>MATH 433</td>
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| Elective hours | 3 |

| Term Semester Credit Hours | 15 |

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<td>Numerical Methods or Principles of</td>
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<tr>
<td>MATH 437</td>
<td>Numerical Analysis</td>
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<tr>
<td>PHYS 208 or</td>
<td>Electricity and Optics or Mathematical</td>
<td>4</td>
</tr>
<tr>
<td>OCNG 451</td>
<td>Modeling of Ocean Climate</td>
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<tr>
<td>CSCE 221</td>
<td>Data Structures and Algorithms</td>
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| Term Semester Credit Hours | 16 |

### Fourth Year

#### Fall

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<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
<td>3</td>
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<tr>
<td>COMM 205</td>
<td>Communication for Technical Professions</td>
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<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
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<td>CSCE 314</td>
<td>Programming Languages</td>
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<td>CSCE 411</td>
<td>Design and Analysis of Algorithms</td>
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<td>CSCE 433</td>
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| Term Semester Credit Hours | 12 |

#### Spring

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<tr>
<td>MATH 325</td>
<td>The Mathematics of Interest</td>
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<td>CSCE 210 - CSCE 452 (p. 698)</td>
<td></td>
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<tr>
<td>ISEN 420</td>
<td>Operations Research I</td>
<td></td>
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<tr>
<td>ISEN 421</td>
<td>Operations Research II</td>
<td></td>
</tr>
<tr>
<td>STAT 407 - STAT 415 (p. 990)</td>
<td></td>
<td>3</td>
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</tbody>
</table>

| Elective hours | 5 |

| Term Semester Credit Hours | 17 |

**Total Semester Credit Hours:** 120

---

1 Select 3 hours from any 200-400 level course.

2 Three elective hours must be chosen from the approved University Core Curriculum (p. 19) list for creative arts. In addition, 6 hours of courses must be in the area of International and Cultural Diversity (p. 34). These may be in addition to University Core Curriculum (p. 19) courses, or if a course in this category satisfies an area of the Core, it can be used to meet both requirements. Students desiring teacher certification should consult the requirements for certification before registering for electives.

If a grade of D or F is earned in any of the following courses, MATH 151/MATH 171, MATH 152/MATH 172, MATH 221/MATH 251/MATH 253,
MATH 220, MATH 323 or MATH 308, this course must be immediately retaken and a grade of C or better earned. The department will allow at most two D’s in upper-level (325-499) courses. If a third D is earned, one of the three courses in which a D was earned must be retaken and a grade of C or better earned.

Applied Mathematical Sciences - BS, Economics Emphasis

Many advances in technology and business are achieved by people applying technical knowledge from statistics, computing science, finance, economics and mathematics. The curriculum in applied mathematical sciences provides study in all of these areas, with ample electives available to allow further in-depth study of any of these areas. In fact, there are six emphases in this curriculum: Applied Mathematics, Statistics, Actuarial Science, Economics, Biological Science and Scientific Computing. The Actuarial Science emphasis includes mathematical finance.

A student completing this program is prepared to enter employment with analytical and quantitative tools relevant to technological industries and/or modern financial markets. On the other hand, with the appropriate electives chosen, the student is prepared to enter quantitatively oriented graduate schools. All advising for this degree option is done through the Undergraduate Program Office in the Department of Mathematics.

Program Requirements

<table>
<thead>
<tr>
<th>First Year</th>
<th>Sem. Credit Hours</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
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<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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<tr>
<td>MATH 170</td>
<td>Freshman Mathematics Laboratory</td>
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<tr>
<td>MATH 171</td>
<td>Analytic Geometry and Calculus</td>
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<td>Select one of the following:</td>
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<tr>
<td>CSCE 110</td>
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<tr>
<td>CSCE 111</td>
<td>Introduction to Computer Science Concepts and Programming</td>
<td></td>
</tr>
<tr>
<td>CSCE 121</td>
<td>Introduction to Program Design and Concepts</td>
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<tr>
<td>CSCE 206</td>
<td>Structured Programming in C</td>
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<td>Select one of the following:</td>
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<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
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<tr>
<td>BIOL 112</td>
<td>Introductory Biology II</td>
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</tr>
<tr>
<td>CHEM 101 &amp; CHEM 111</td>
<td>Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td>CHEM 102 &amp; CHEM 112</td>
<td>Fundamentals of Chemistry II and Fundamentals of Chemistry Laboratory II</td>
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<tr>
<td>CHEM 103 &amp; CHEM 113</td>
<td>Structure and Bonding and Physical and Chemical Principles</td>
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<tr>
<td>CHEM 104 &amp; CHEM 114</td>
<td>Chemistry of the Elements and Qualitative Analysis</td>
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<td>ASTR 111</td>
<td>Overview of Modern Astronomy</td>
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<table>
<thead>
<tr>
<th>Second Year</th>
<th>Sem. Credit Hours</th>
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<tbody>
<tr>
<td>Fall</td>
<td></td>
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</tr>
<tr>
<td>ECON 202 or ECON 203</td>
<td>Principles of Economics or Principles of Economics</td>
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<tr>
<td>HIST 106</td>
<td>History of the United States</td>
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<tr>
<td>MATH 220</td>
<td>Foundations of Mathematics</td>
<td>3</td>
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<tr>
<td>MATH 221</td>
<td>Several Variable Calculus</td>
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<tr>
<td>STAT 211</td>
<td>Principles of Statistics I</td>
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<table>
<thead>
<tr>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td>MATH 308</td>
<td>Differential Equations</td>
<td>3</td>
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<tr>
<td>MATH 323</td>
<td>Linear Algebra</td>
<td>3</td>
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<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
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<tr>
<td>STAT 212</td>
<td>Principles of Statistics II</td>
<td>3</td>
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<tr>
<td>Language, philosophy and culture (p. 21)</td>
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<table>
<thead>
<tr>
<th>Third Year</th>
<th>Sem. Credit Hours</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 409</td>
<td>Advanced Calculus I</td>
<td>3</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 218</td>
<td>Mechanics</td>
<td>4</td>
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<tr>
<td>MATH 325</td>
<td>The Mathematics of Interest</td>
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<tr>
<td>Elective hours 2</td>
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<thead>
<tr>
<th>Spring</th>
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<tbody>
<tr>
<td>MATH 411</td>
<td>Mathematical Probability</td>
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</tr>
<tr>
<td>PHYS 208 or OCNG 451</td>
<td>Electricity and Optics or Mathematical Modeling of Ocean Climate</td>
<td>4</td>
</tr>
</tbody>
</table>
Applied Mathematical Sciences - BS, Math Emphasis

Many advances in technology and business are achieved by people applying technical knowledge from statistics, computing science, finance, economics and mathematics. The curriculum in applied mathematical sciences provides study in all of these areas, with ample electives available to allow further in-depth study of any of these areas. In fact, there are six emphases in this curriculum: Applied Mathematics, Statistics, Actuarial Science, Economics, Biological Science and Scientific Computing. The Actuarial Science emphasis includes mathematical finance.

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Second Year

Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>ECON 202 or ECON 203</td>
<td>Economics</td>
<td>3</td>
</tr>
<tr>
<td>HIST 106</td>
<td>History of the United States</td>
<td>3</td>
</tr>
<tr>
<td>MATH 220</td>
<td>Foundations of Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>MATH 221</td>
<td>Several Variable Calculus</td>
<td>4</td>
</tr>
<tr>
<td>STAT 211</td>
<td>Principles of Statistics I</td>
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</table>

Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 308</td>
<td>Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>MATH 323</td>
<td>Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
</tr>
<tr>
<td>STAT 212</td>
<td>Principles of Statistics II</td>
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<td>Language, philosophy and culture (p. 21)</td>
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Third Year

Fall

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Hours</th>
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<tbody>
<tr>
<td>MATH 409</td>
<td>Advanced Calculus I</td>
<td>3</td>
</tr>
<tr>
<td>POLS 207</td>
<td>State and Local Government</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 218</td>
<td>Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>MATH 410 or MATH 446</td>
<td>Advanced Calculus II or Principles of Analysis I</td>
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<tr>
<td>Elective hours</td>
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Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Description</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>MATH 417 or MATH 437</td>
<td>Numerical Methods or Principles of Numerical Analysis</td>
<td>4</td>
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<tr>
<td>PHYS 208 or OCNG 451</td>
<td>Electricity and Optics or Mathematical Modeling of Ocean Climate</td>
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<tr>
<td>MATH 415 or MATH 433</td>
<td>Modern Algebra I or Applied Algebra</td>
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<tr>
<td>Elective hours</td>
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</tbody>
</table>

Fourth Year

Fall

Select one of the following:
- COMM 203 | Public Speaking | 3 |
- COMM 205 | Communication for Technical Professions | 3 |
- COMM 243 | Argumentation and Debate | 3 |

Select one of the following:
- MATH 412 | Theory of Partial Differential Equations | 3 |
- MATH 414 | Fourier Series and Wavelets | 3 |
- MATH 442 | Mathematical Modeling | 3 |
- MATH 470 | Communications and Cryptography | 3 |
- MATH 471 | Communications and Cryptography II | 3 |

Select up to six hours from the following:
- STAT 407-STAT 415 (p. 990) | | 6 |

<table>
<thead>
<tr>
<th>Program Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Applied Mathematical Sciences - BS, Statistics Emphasis</strong></td>
</tr>
</tbody>
</table>

Many advances in technology and business are achieved by people applying technical knowledge from statistics, computing science, finance, economics and mathematics. The curriculum in applied mathematical sciences provides study in all of these areas, with ample electives available to allow further in-depth study of any of these areas. In fact, there are six emphases in this curriculum: Applied Mathematics, Statistics, Actuarial Science, Economics, Biological Science and Scientific Computing. The Actuarial Science emphasis includes mathematical finance.

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MATH 170  Freshman Mathematics Laboratory  1
MATH 171  Analytic Geometry and Calculus  4
Select one of the following:  4
CSCE 110  Programming I
CSCE 111  Introduction to Computer Science Concepts and Programming
CSCE 121  Introduction to Program Design and Concepts
CSCE 206  Structured Programming in C
Select one of the following:  4
BIOL 111  Introductory Biology I
BIOL 112  Introductory Biology II
CHEM 101 & CHEM 111  Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory I
CHEM 102 & CHEM 112  Fundamentals of Chemistry II and Fundamentals of Chemistry Laboratory II
CHEM 103 & CHEM 113  Structure and Bonding and Physical and Chemical Principles
CHEM 104 & CHEM 114  Chemistry of the Elements and Qualitative Analysis
ASTR 111  Overview of Modern Astronomy

Term Semester Credit Hours  16

Spring
HIST 105  History of the United States  3
MATH 170  Freshman Mathematics Laboratory  1
MATH 172  Calculus  4
Select one of the following:  4
CSCE 110  Programming I
CSCE 111  Introduction to Computer Science Concepts and Programming
CSCE 121  Introduction to Program Design and Concepts
CSCE 206  Structured Programming in C
Select one of the following:

BIOL 111  Introductory Biology I
BIOL 112  Introductory Biology II
CHEM 101 & CHEM 111  Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory I
CHEM 102 & CHEM 112  Fundamentals of Chemistry II and Fundamentals of Chemistry Laboratory II
CHEM 103 & CHEM 113  Structure and Bonding and Physical and Chemical Principles
CHEM 104 & CHEM 114  Chemistry of the Elements and Qualitative Analysis
ASTR 111  Overview of Modern Astronomy

Term Semester Credit Hours  16

Fall
ECON 202 or ECON 203  Principles of Economics or Principles of  3
HIST 106  History of the United States  3
Select one of the following:

MATH 220  Foundations of Mathematics  3
MATH 221  Several Variable Calculus  4
STAT 211  Principles of Statistics I  3

Term Semester Credit Hours  16

Spring
MATH 308  Differential Equations  3
MATH 323  Linear Algebra  3
POLS 206  American National Government  3
STAT 212  Principles of Statistics II  3
Language, philosophy and culture (p. 21)  3

Term Semester Credit Hours  15

Third Year
Fall
MATH 409  Advanced Calculus I  3
POLS 207  State and Local Government  3
PHYS 218  Mechanics  4
Select one of the following:  3

MATH 411  Mathematical Probability
STAT 407  Principles of Sample Surveys
STAT 408  Introduction to Linear Models
STAT 414  Mathematical Statistics I
Elective hours  3

Term Semester Credit Hours  16

Spring
MATH 417 or MATH 437  Numerical Methods or Principles of Numerical Analysis  4
PHYS 208 or OCNG 451  Electricity and Optics or Mathematical Modeling of Ocean Climate  4
ISEN 420 or ISEN 421  Operations Research I or Operations Research II  3
Elective hours  4

Term Semester Credit Hours  15

Fourth Year
Fall
Select one of the following:  3

COMM 203  Public Speaking
COMM 205  Communication for Technical Professions
COMM 243  Argumentation and Debate
Select six to twelve hours from the following:  6-12

MATH 325  The Mathematics of Interest
MATH 407-MATH 489 (p. 860)
STAT 485  Directed Studies
STAT 489  Special Topics in...

Term Semester Credit Hours  15

Spring
Select six hours from the following:  6

CSCE 210 - CSCE 499 (p. 698)
ISEN 400 - ISEN 499 (p. 838)
STAT 400 - STAT 499 (p. 990)
Elective hours  

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Semester Credit Hours:</td>
<td>120</td>
</tr>
</tbody>
</table>

1 Select 3 hours from any 200-400 level course.

2 Three elective hours must be chosen from the approved University Core Curriculum (p. 19) list for creative arts. In addition, 6 hours of courses must be in the area of International and Cultural Diversity (p. 34). These may be in addition to University Core Curriculum (p. 19) courses, or if a course in this category satisfies an area of the Core, it can be used to meet both requirements. Students desiring teacher certification should consult the requirements for certification before registering for electives.

3 Except CSCE 442.

If a grade of D or F is earned in any of the following courses, MATH 151/MATH 171, MATH 152/MATH 172, MATH 221/MATH 251/MATH 253, MATH 220, MATH 323 or MATH 308, this course must be immediately retaken and a grade of C or better earned. The department will allow at most two D's in upper-level (325-499) courses. If a third D is earned, one of the three courses in which a D was earned must be retaken and a grade of C or better earned.

Mathematics - BA

The Bachelor of Arts degree in Mathematics is intended for students who are interested in a traditional liberal arts education in mathematics. A minor field of study must be chosen for this degree.

Program Requirements

First Year

Fall

| ENGL 104 | Composition and Rhetoric | 3 |
| MATH 170 | Freshman Mathematics Laboratory | 1 |
| MATH 171 | Analytic Geometry and Calculus | 4 |
| Select one of the following: | | |
| American History (p. 23) | | 3 |
| Government/Political science (p. 23) | | |

| Select one of the following: | | |
| BIOL 111 | Introductory Biology I | 4 |
| BIOL 112 | Introductory Biology II | |
| CHEM 101 | Fundamentals of Chemistry I | |
| & CHEM 111 | and Fundamentals of Chemistry Laboratory I | |
| CHEM 102 | Fundamentals of Chemistry II | |
| & CHEM 112 | and Fundamentals of Chemistry Laboratory II | |
| CHEM 103 | Structure and Bonding | |
| & CHEM 113 | and Physical and Chemical Principles | |
| CHEM 104 | Chemistry of the Elements | |
| & CHEM 114 | and Qualitative Analysis | |
| ASTR 111 | Overview of Modern Astronomy | |

Spring

<table>
<thead>
<tr>
<th>Term Semester Credit Hours</th>
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<tbody>
<tr>
<td>MATH 170</td>
<td>Freshman Mathematics Laboratory</td>
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<tr>
<td>MATH 172</td>
<td>Calculus</td>
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<tr>
<td>American History (p. 23)</td>
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<tr>
<td>Government/Political science (p. 23)</td>
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</tbody>
</table>

Select one of the following:

| CSCE 110 | Programming I | 4 |
| CSCE 111 | Introduction to Computer Science Concepts and Programming | |
| CSCE 121 | Introduction to Program Design and Concepts | |
| CSCE 206 | Structured Programming in C | |

Second Year

Fall

| MATH 220 | Foundations of Mathematics | 3 |
| MATH 222 | Several Variable Calculus | 4 |
| STAT 211 | Principles of Statistics I | 3 |
| Select one of the following: | | 3 |
| American History (p. 23) | | |
| Government/Political science (p. 23) | | |

Select one of the following:

| BIOL 111 | Introductory Biology I | |
| BIOL 112 | Introductory Biology II | |
| CHEM 101 | Fundamentals of Chemistry I | |
| & CHEM 111 | and Fundamentals of Chemistry Laboratory I | |
| CHEM 102 | Fundamentals of Chemistry II | |
| & CHEM 112 | and Fundamentals of Chemistry Laboratory II | |
| CHEM 103 | Structure and Bonding | |
| & CHEM 113 | and Physical and Chemical Principles | |
| CHEM 104 | Chemistry of the Elements | |
| & CHEM 114 | and Qualitative Analysis | |
| ASTR 111 | Overview of Modern Astronomy | |

Spring

<table>
<thead>
<tr>
<th>Term Semester Credit Hours</th>
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<tbody>
<tr>
<td>MATH 308</td>
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<td>MATH 323</td>
<td>Linear Algebra</td>
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<tr>
<td>Select one of the following:</td>
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<tr>
<td>American History (p. 23)</td>
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</tr>
<tr>
<td>Government/Political science (p. 23)</td>
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</tr>
</tbody>
</table>

Select one of the following:

| COMM 203 | Public Speaking | |
| COMM 205 | Communication for Technical Professions | |
| COMM 243 | Argumentation and Debate | |
| Minor elective 2 | | 3 |

Third Year

Fall

| MATH 409 | Advanced Calculus I | 3 |
| PHYS 218 | Mechanics | 4 |
### Mathematics - BS

The Bachelor of Science in Mathematics provides the student with an in-depth study of both science (physics, chemistry, biology) and mathematics.

## Program Requirements

### First Year

<table>
<thead>
<tr>
<th>Term</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>Fall</td>
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<tr>
<td>ENGL 104 Composition and Rhetoric</td>
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<td>MATH 170 Freshman Mathematics Laboratory</td>
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<td>MATH 171 Analytic Geometry and Calculus</td>
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<td>Select one of the following:</td>
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<td>Creative Arts (p. 22)</td>
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<tr>
<td>Social and behavioral sciences (p. 23)</td>
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<td>Free elective</td>
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<tr>
<td>Minor elective</td>
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### Spring

<table>
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<tr>
<th>Term Semester Credit Hours</th>
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</tr>
</thead>
<tbody>
<tr>
<td>MATH elective (p. 860)</td>
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</tr>
<tr>
<td>Select one of the following:</td>
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</tr>
<tr>
<td>Creative arts (p. 22)</td>
<td></td>
</tr>
<tr>
<td>Social and behavioral sciences (p. 23)</td>
<td></td>
</tr>
<tr>
<td>Free elective</td>
<td>3</td>
</tr>
<tr>
<td>Minor elective</td>
<td>2</td>
</tr>
</tbody>
</table>

### Total Semester Credit Hours: 120

1. Select 3 hours from any 200-400 level Language, philosophy and culture (p. 21) course.
2. A 15-18 hour minor field of study should be chosen in conference with a departmental advisor.
3. Six hours of courses must be in the area of international and cultural diversity. These may be in addition to other University Core Curriculum courses, or if a course in this category satisfies an area of the Core, it can be used to meet both requirements. Students desiring teacher certification should consult the requirements for certification before registering for electives.
4. Nine of the 12 hours of math elective courses are to be from any 400- or 600-level MATH, excluding MATH 401 and MATH 601. The last three hours can be from any 400- or 600-level MATH (excluding MATH 401 or MATH 601), any 400-level STAT, CSCE 221 or higher, or any 400-level ISEN, excluding any 485 course in any department without permission of a departmental advisor. Students wishing to be certified must take MATH 403 and MATH 467. Students who plan to attend graduate school are encouraged to take MATH 416, MATH 447 and at least one 600-level course.

5. Three hours must be social and behavioral sciences (p. 23) and three hours must be creative arts (p. 22).

If a grade of D or F is earned in any of the following courses, MATH 151/MATH 171, MATH 152/MATH 172, MATH 221/MATH 251/MATH 253, MATH 220, MATH 323 or MATH 308, this course must be immediately retaken and a grade of C or better earned. The department will allow at most two Ds in upper-level (325-499) courses. If a third D is earned, one of the three courses in which a D was earned must be retaken and a grade of C or better earned.

### Spring

<table>
<thead>
<tr>
<th>Term Semester Credit Hours</th>
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<tbody>
<tr>
<td>MATH 170 Freshman Mathematics Laboratory</td>
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<tr>
<td>MATH 172 Calculus</td>
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<td>Select one of the following:</td>
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<tr>
<td>American history (p. 23)</td>
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<tr>
<td>Government/Political science (p. 23)</td>
<td></td>
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<tr>
<td>Select one of the following:</td>
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</tr>
<tr>
<td>BIOL 111 Introductory Biology I</td>
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<tr>
<td>BIOL 112 Introductory Biology II</td>
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<tr>
<td>CHEM 101 Fundamentals of Chemistry I &amp; CHEM 111 and Fundamentals of Chemistry Laboratory I</td>
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<tr>
<td>CHEM 102 Fundamentals of Chemistry II &amp; CHEM 112 and Fundamentals of Chemistry Laboratory II</td>
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<tr>
<td>CHEM 103 Structure and Bonding &amp; CHEM 113 and Physical and Chemical Principles</td>
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<tr>
<td>CHEM 104 Chemistry of the Elements &amp; CHEM 114 and Qualitative Analysis</td>
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<tr>
<td>ASTR 111 Overview of Modern Astronomy</td>
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### Fall

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<tr>
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<tr>
<td>Government/Political science (p. 23)</td>
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<td>CSCE 110 Programming I</td>
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<tr>
<td>CSCE 111 Introduction to Computer Science Concepts and Programming</td>
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<td>CSCE 121 Introduction to Program Design and Concepts</td>
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<td>CSCE 206 Structured Programming in C</td>
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<tr>
<td>BIOL 112</td>
<td>Introductory Biology II</td>
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<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
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<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
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<tr>
<td>CHEM 102</td>
<td>Fundamentals of Chemistry II</td>
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<td>&amp; CHEM 112</td>
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<td>&amp; CHEM 113</td>
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<tr>
<td>ASTR 111</td>
<td>Overview of Modern Astronomy</td>
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Second Year

**Fall**

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<tr>
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<th>Term Semester Credit Hours</th>
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<tbody>
<tr>
<td>MATH 220</td>
<td>Foundations of Mathematics</td>
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<tr>
<td>MATH 221</td>
<td>Several Variable Calculus</td>
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<tr>
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**Spring**

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<td>Differential Equations</td>
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<td>MATH 323</td>
<td>Linear Algebra</td>
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<td>PHYS 218</td>
<td>Mechanics</td>
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<td>Government/Political science (p. 23)</td>
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<tr>
<td>Language, philosophy and culture (p. 21) ⁴</td>
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Third Year

**Fall**

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<td>MATH 409</td>
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<tr>
<td>MATH 415</td>
<td>Modern Algebra I</td>
<td>3</td>
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<td>Free elective</td>
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<tr>
<td>Science elective ¹</td>
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<td>COMM 203</td>
<td>Public Speaking</td>
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<td>COMM 205</td>
<td>Communication for Technical Professions</td>
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<td>COMM 243</td>
<td>Argumentation and Debate</td>
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**Spring**

<table>
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<th>Course Title</th>
<th>Term Semester Credit Hours</th>
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<tbody>
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<td>MATH 410 or</td>
<td>Advanced Calculus II or Principles of</td>
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<td>MATH 446</td>
<td>Analysis I</td>
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<tr>
<td>MATH 416</td>
<td>Modern Algebra II</td>
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<tr>
<td>PHYS 208 or</td>
<td>Electricity and Optics or Mathematical</td>
<td>4</td>
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<tr>
<td>OCNG 451</td>
<td>Modeling of Ocean Climate</td>
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<tr>
<td>CORE elective ²</td>
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</tbody>
</table>

Total Semester Credit Hours: 120

¹ Science electives should be chosen from biology, biochemistry, chemistry, genetics or physics courses after consultation with the student’s advisor. At least 6 hours must be 200-level or above.

² Three hours must be creative arts (p. 22) and three hours must be social and behavioral sciences (p. 23). In addition, six hours must be in the area of international and cultural diversity. These may be in addition to other University Core Curriculum (p. 19) courses, or if a course in this category satisfies an area of the Core, it can be used to meet both requirements. Students desiring teacher certification should consult the requirements for certification before registering for electives.

³ Twelve hours must be chosen from any 400- or 600-level MATH (excluding MATH 401, MATH 403 and MATH 601). Students are required to take at least one of the following: MATH 427, MATH 431, MATH 436, MATH 439. Students are encouraged to take MATH 412, MATH 414, MATH 442, or MATH 470. Students who plan to attend graduate school are encouraged to take MATH 447 and at least one 600-level course. Departmental permission is required to take MATH 485 or to enroll in a 600-level MATH course.

⁴ Select 3 hours from any 200- to 400-level Language, philosophy and culture (p. 21) course.

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**Mathematics - Minor**

**Getting a Minor in Mathematics is Easy!**

Students wishing to earn a minor in mathematics do not need to visit the Mathematics Department to do so. They should see their advisor, and inform them of their intention to earn a minor in mathematics, and to have that information entered into COMPASS.

The department also wants to point out to students who are majoring in engineering or one of the sciences that it might not take more than another
18 to 24 hours to get a double major in mathematics. If that is of interest to you, contact Mathematics Undergraduate Program Office.

Program Requirements

Non-math majors can obtain a minor in mathematics by meeting the following requirements:

MATH 151 Engineering Mathematics I (or equivalent) 4
or MATH 171 or Analytic Geometry and Calculus
MATH 152 Engineering Mathematics II (or equivalent) 4
or MATH 172 or Calculus
Select two of the following: 6
MATH 220 Foundations of Mathematics
MATH 323 Linear Algebra 1
300-400 level Mathematics course 2
400 level Mathematics course 2

Total Semester Credit Hours 17

1 Only one of MATH 323, MATH 304, MATH 309, or MATH 311 can be taken to satisfy the minor, due to the course content.
2 All 300-400 level MATH courses MUST be taken at Texas A&M University. No transfer work will be accepted.

Students must make a grade of "C" or better in all courses.

MATH 131, MATH 141, MATH 142, MATH 365, MATH 366, MATH 367, MATH 368, MATH 403, and MATH 485 may not be used to satisfy the requirements. MATH 485 will receive approval only under exceptional circumstances.

Department of Physics and Astronomy

Physics seeks to understand the fundamental workings of nature, from the constituents of matter deep within the nuclei of atoms, to the most distant galaxies of our expanding universe, to everyday phenomena of emergent complexity, self-organization and chaos. The resulting basic physical knowledge provides a firm foundation for innovations and is often the driving force of advanced technology. Lasers, compact disks, global positioning devices, magnetic resonance imaging machines and gigabit storage media were all made possible by key advances in physics.

Physicists have a curiosity that thrives on the challenge of solving problems. Consistent with this, the physics program at Texas A&M strives to teach analytical thinking and quantitative problem-solving skills. This enables students to work productively in physics, in areas closely related to physics, and in a wide variety of areas outside of physics proper. Physicists can be found in almost any discipline that requires complex problem-solving skills. Some engage in cutting-edge research to increase our basic knowledge of the universe. Some apply new-found knowledge to make practical advances in the fields of science, medical science and engineering. Still others use their knowledge to advocate, advise, inform, instruct and administrate as lawyers, consultants, journalists/writers, teachers and managers.

The Department of Physics and Astronomy offers two undergraduate degree programs, a Bachelor of Arts and a Bachelor of Science. The Department of Physics and Astronomy also offers the graduate degrees of Master of Science and Doctor of Philosophy. Highly qualified undergraduates are encouraged to take courses in the graduate program as part of their degree program.

The Texas A&M Department of Physics and Astronomy has strong research groups in the areas of Applied Physics, Astronomy and Astrophysics, Atomic Physics (including Molecular Physics and Quantum Optics), Condensed Matter Physics ( Liquids and Solids), Elementary Particle Physics and Nuclear Physics. During the course of their undergraduate experience at Texas A&M, physics majors have the opportunity to work with faculty in all of these areas. The Astronomy program is very active. Physics majors seeking a BS have the opportunity to take special topics courses in the above disciplines, as well as ASTR 314, to satisfy their science or technical elective.

Faculty

Abanov, Artem G, Associate Professor
Physics And Astronomy
PhD, Texas A&M University, 1998

Adair, Thomas W, Professor
Physics And Astronomy
PhD, Texas A&M University, 1965

Agnolet, Glenn, Professor
Physics And Astronomy
PhD, Cornell University, 1983

Allen, Roland E, Professor
Physics And Astronomy
PhD, University of Texas, Austin, 1969

Bassichis, William H, Professor
Physics And Astronomy
PhD, Case Western Reserve University, 1963

Becker, Katrin, Professor
Physics And Astronomy
PhD, University of Bonn, 1994

Becker, Melanie, Professor
Physics And Astronomy
PhD, University of Bonn, Germany, 1994

Belyanin, Alexey A, Professor
Physics And Astronomy
PhD, Institute of Applied Physics, Russian Academy of Sciences, 1995

Chin, Siu A, Professor
Physics And Astronomy
PhD, Massachusetts Institute of Technology, 1975

Depoy, Darren L, Professor
Physics And Astronomy
PhD, University of Hawaii, 1987

Dhar, Barun K, Lecturer
Physics And Astronomy
PhD, University of Minnesota, 2012

Dutta, Bhaskar, Professor
Physics And Astronomy
PhD, Oklahoma State University, 1995
Ene, Emanuela, Lecturer
Physics And Astronomy
PhD, Oklahoma State University, 2013

Erskhiova, Tatiana L, Senior Lecturer
Physics And Astronomy
PhD, Institute of Applied Physics, Russian Academy of Sciences, 1999

Eusebi, Ricardo, Associate Professor
Physics And Astronomy
PhD, University of Rochester, 2006

Finkelstein, Alexander, Professor
Physics And Astronomy
PhD, Landa Institute for Theoretical Physics, 1972

Ford, Albert L, Professor
Physics And Astronomy
PhD, University of Texas, Austin, 1972

Fries, Rainer J, Associate Professor
Physics And Astronomy
PhD, University of Regensburg, Germany, 2001

Fry, Edward S, Distinguished Professor
Physics And Astronomy
PhD, University of Michigan, 1969

Gagliardi, Carl A, Professor
Physics And Astronomy
PhD, Princeton University, 1982

Hardy, John C, Distinguished Professor
Physics And Astronomy
PhD, McGill University, 1965

Herschbach, Dudley R, Distinguished Professor
Physics And Astronomy
PhD, Harvard University, 1958

Kamon, Teruki, Professor
Physics And Astronomy
PhD, University of Tsukuba, 1986

Katzgraber, Helmut G, Professor
Physics And Astronomy
PhD, University of California, Santa Cruz, 2001

Ko, Che-Ming, Professor
Physics And Astronomy
PhD, State University of New York at Stony Brook, 1973

Kocharovskaya, Olga A, Distinguished Professor
Physics And Astronomy
PhD, Gorky State University (Russia), 1986

Kocharovsky, Vitaly V, Professor
Physics And Astronomy
PhD, Institute of Applied Physics, Russian Academy of Sciences, 1998

Krisilunas, Kevin L, Lecturer
Physics And Astronomy
PhD, University of Washington, 2000

Lee, David M, Distinguished Professor
Physics And Astronomy
PhD, Yale University, 1959

Lyuksyutov, Igor F, Professor
Physics And Astronomy
DVM, Highest Attestation Commission at Ministry of Education and
Science of Russian Federation, 1990
PhD, Moscow and Institute of Physics, 1990

Macri, Lucas M, Associate Professor
Physics And Astronomy
PhD, Harvard University, 2001

Mahapatra, Rupak K, Associate Professor
Physics And Astronomy
PhD, University of Minnesota, 2000

Marshall, Jennifer, Assistant Professor
Physics And Astronomy
PhD, Ohio State University, 2006
MS, Ohio State University, 2003

McIntyre, Peter M, Professor
Physics And Astronomy
PhD, University of Chicago, 1973

Melconian, Daniel G, Associate Professor
Physics And Astronomy
PhD, Simon Fraser University, 2006

Mioduszewski, Saskia, Associate Professor
Physics And Astronomy
PhD, University of Tennessee, 1999

Mirabolfathi, Nader, Research Associate Professor
Physics And Astronomy
PhD, University of Paris, 2002
MS, Shahid Beheshti University, Iran, 1997

Nanopoulos, Dimitri V, Distinguished Professor
Physics And Astronomy
PhD, University of Sussex, Falmer, Brighton, England, 1973

Naugle, Donald G, Professor
Physics And Astronomy
PhD, Texas A&M University, 1965

Papovich, Casey J, Associate Professor
Physics And Astronomy
PhD, John Hopkins University, 2002

Pokrovsky, Valery, Distinguished Professor
Physics And Astronomy
PhD, Tomsk State University, 1957

Pope, Christopher N, Distinguished Professor
Physics And Astronomy
PhD, University of Cambridge, 1981

Rapp, Ralf F, Professor
Physics And Astronomy
PhD, Rheinische Friedrich-Wilhelma University, Bonn, 1996
Majors

- Bachelor of Arts in Physics (p. 564)
- Bachelor of Science in Physics (p. 565)

Minors

- Astrophysics Minor (p. 566)
- Physics Minor (p. 566)

Physics - BA

The Bachelor of Arts curriculum provides the student with a firm foundation in physics and with the flexibility to choose from a large number of elective courses, thus permitting the student to explore other interests. Except for those students pursuing teacher certification, some of these elective courses are chosen to satisfy the requirements of a minor field of study. The student can, therefore, customize his or her program of study in preparation for a career in any science-related or science-required field, from intellectual property law and science reporting to physics teaching. Although not required for the BA program, students have the opportunity to become directly involved in any of the active research programs in the Department of Physics and Astronomy.

Program Requirements

First Year

<table>
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<tr>
<th>Fall</th>
<th>Semester Credit Hours</th>
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<tbody>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
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</table>
HIST 105  History of the United States
MATH 171  Analytic Geometry and Calculus
PHYS 101  Freshman Physics Orientation
PHYS 218  Mechanics

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<th>Course</th>
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**Term Semester Credit Hours**

**Spring**
CHEM 107 & CHEM 117  General Chemistry for Engineering Students and General Chemistry for Engineering Students Laboratory
HIST 106  History of the United States
MATH 172  Calculus
PHYS 102  Freshman Physics Orientation II
PHYS 208  Electricity and Optics

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<tr>
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**Term Semester Credit Hours**

**Second Year**
Fall
MATH 221  Several Variable Calculus
MATH 308  Differential Equations
PHYS 221  Optics and Thermal Physics
POLS 206  American National Government

<table>
<thead>
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<th>Course</th>
<th>Credit Hours</th>
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**Term Semester Credit Hours**

**Spring**
PHYS 225  Electronic Circuits and Applications
PHYS 309  Modern Physics
PHYS 331  Theoretical Methods for Physicists

<table>
<thead>
<tr>
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**Term Semester Credit Hours**

**Third Year**
Fall
PHYS 302  Advanced Mechanics I
PHYS 304  Advanced Electricity and Magnetism I
PHYS 332  Theoretical Methods for Physicists II
POLS 207  State and Local Government

<table>
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**Term Semester Credit Hours**

**Spring**
PHYS 327  Experimental Physics
PHYS 412  Quantum Mechanics I

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**Term Semester Credit Hours**

**Fourth Year**
Fall
PHYS 444  Art of Communication in Physics I: Communicating Science to Scientists
PHYS 445  Art of Communication in Physics II: Communicating Science to Non-Scientists

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**Term Semester Credit Hours**

**Spring**
PHYS 401  Computational Physics

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<tbody>
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</table>

**Term Semester Credit Hours**

**Total Semester Credit Hours:**

120

1 A physics major must complete the foundation courses (PHYS 101, PHYS 102, PHYS 208, PHYS 218, PHYS 221, PHYS 309, PHYS 331, CHEM 107/CHEM 117, MATH 171, MATH 172, MATH 221, MATH 308) with a grade of C or better and have a 2.0 cumulative GPR before taking non-foundation upper-level physics courses.
2 Any course in this category from the approved University Core Curriculum list of courses.
3 A minor field must be selected in conference with the student’s advisor. In addition, 6 hours of courses must be in the area of international and cultural diversity. These may be in addition to University Core Curriculum courses, or if a course in this category satisfies an area of the Core, it can be used to meet both requirements.
4 To register for PHYS 401 a student must be able to program in a high level language, such as FORTRAN, Java or C. This prerequisite can be satisfied by taking CSCE 206 or the equivalent.
5 Approved W course designation.
6 Any approved Communication course with an ENGL prefix.

**Physics - BS**

The Bachelor of Science curriculum is more rigorous in its physics and mathematics course requirements and is designed primarily for students who wish to pursue an advanced degree in physics or employment as a professional physicist in an industrial setting. Because physics forms the basis of many other sciences such as chemistry, material science, oceanography, nano-engineering and geophysics, the BS program is an excellent preparation for advanced degrees in these fields. In addition, physicists are increasingly applying their talents to molecular biology, biochemistry and medicine. An important part of the BS program is student participation in experimental or theoretical research with physics and astronomy faculty.

**Program Requirements**

**First Year**
Fall

<table>
<thead>
<tr>
<th>Course</th>
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</thead>
<tbody>
<tr>
<td>ENGL 104  Composition and Rhetoric</td>
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**Term Semester Credit Hours**

**Spring**
CHEM 107  General Chemistry for Engineering Students and General Chemistry for Engineering Students Laboratory  
American history elective (p. 23)  
MATH 172  Calculus  
PHYS 102  Freshman Physics Orientation II  
PHYS 208  Electricity and Optics  

Term Semester Credit Hours: 16

Second Year

Fall
MATH 221  Several Variable Calculus  
MATH 308  Differential Equations  
PHYS 221  Optics and Thermal Physics  
POLS 206  American National Government  
Language, philosophy and culture elective (p. 21)  

Term Semester Credit Hours: 16

Spring
PHYS 225  Electronic Circuits and Applications  
PHYS 309  Modern Physics  
PHYS 331  Theoretical Methods for Physicists I  
POLS 207  State and Local Government  
Communication elective (p. 20)  

Term Semester Credit Hours: 16

Third Year

Fall
PHYS 302  Advanced Mechanics I  
PHYS 304  Advanced Electricity and Magnetism I  
PHYS 332  Theoretical Methods for Physicists II  
Social and behavioral science elective (p. 23)  
Creative arts elective (p. 22)  

Term Semester Credit Hours: 15

Spring
PHYS 303  Advanced Mechanics II  
PHYS 305  Advanced Electricity and Magnetism II  
PHYS 327  Experimental Physics  
PHYS 412  Quantum Mechanics I  
Electives  

Term Semester Credit Hours: 15

Fourth Year

Fall
PHYS 408  Thermodynamics and Statistical Mechanics  
PHYS 414  Quantum Mechanics II  
PHYS 426  Physics Laboratory  
PHYS 444  Art of Communication in Physics I: Communicating Science to Scientists  
PHYS 445  Art of Communication in Physics II: Communicating Science to Non-Scientists  
PHYS 491  Research  

Term Semester Credit Hours: 14

Spring
PHYS 401  Computational Physics  
PHYS 425  Physics Laboratory  
PHYS 491  Research  
Science or technical elective  
Electives  

Term Semester Credit Hours: 13

Total Semester Credit Hours: 120

A physics major must complete the foundation courses (PHYS 101, PHYS 102, PHYS 208, PHYS 218, PHYS 221, PHYS 309, CHEM 107/CHEM 117, MATH 171, MATH 172, MATH 221, MATH 308) with a grade of C or better and have a 2.0 cumulative GPR before taking non-foundation upper-level physics courses.

Any approved Communication course with an ENGL prefix.

Electives should be chosen in consultation with the student's advisor.

If the student has not fulfilled the six hour international and cultural diversity Graduation requirement with courses used to meet areas of the Core, they must fulfill this requirement with six of their elective hours.

To register for PHYS 401 a student must be able to program in a high level language, such as FORTRAN, Java or C. This prerequisite can be satisfied by taking CSCE 206 or the equivalent.

ASTR 314 or any 400-level physics, science or technical elective, except the writing intensive courses, PHYS 444 and PHYS 445.

Approved W course designation.

Maximum combination of 18 hours of 481, 482, 485 and/or 491.

Astrophysics - Minor

The Department of Physics and Astronomy offers a minor in astrophysics. Contact the department for more information.

Program Requirements

PHYS 208  Electricity and Optics  
ASTR 314  Survey of Astronomy  
ASTR 320  Astrophysical Research Methods  
Directed electives  
Select two of the following:
ASTR 401  Stars and Extrasolar Planets  
ASTR 403  Extragalactic Astronomy and Cosmology  
ASTR 491  Research  

Total Semester Credit Hours: 15

1 May be taken in absentia.

Physics - Minor

The Department of Physics and Astronomy offers a minor in physics. Contact the department for more information.

Program Requirements

Students who wish to complete a minor in physics must satisfy the following requirements:
PHYS 218  Mechanics  4
PHYS 208  Electricity and Optics  4
PHYS 221  Optics and Thermal Physics  3
PHYS 222  Modern Physics for Engineers  3
or PHYS 309  or Modern Physics
300–400 level physics elective (p. 934)  3

Total Semester Credit Hours 17

1  Must make a grade of "C" or better.
2  Select from PHYS 300-399 (except PHYS 331, PHYS 332), or ASTR 314 in consultation with an advisor.

Department of Statistics

The science of statistics deals with the collection and summarization of data, design of experiments and surveys, measurement of the magnitude of variation in both experimental and survey data, estimation of population parameters with measures of their accuracy and precision, tests of hypotheses about populations and studies of the relationships between two or more variables. While the ideal of science is to achieve a systematic interrelationship of facts, scientific methods must be a pursuit of this ideal by experimentation, observation and logical arguments from various accepted postulates. Thus, the science of statistics is a set of scientific principles and methodologies that are useful in reaching conclusions about populations and processes when the available information is both limited and variable. Hence, statistical principles are useful in all the sciences, both physical and social. Many practical applications of statistics are found in a wide variety of fields, including biology, education, social sciences, engineering, business, government and agriculture.

The Department of Statistics offers training in statistics leading to degrees of Master of Science and Doctor of Philosophy, and provides many courses for students majoring in the Bachelor of Science degree in applied mathematical sciences. This undergraduate curriculum provides the student with a firm foundation in mathematics, statistics and computing science.

Faculty

Akleman, Derya G, Senior Lecturer
Statistics
PhD, Texas A&M University, 1996

Bhattacharya, Anirban, Assistant Professor
Statistics
PhD, Duke University, 2012

Carroll, Julie H, Senior Lecturer
Statistics
MS, Texas A&M University, 1990
MS, Texas A&M University, 1985

Carroll, Raymond J, Distinguished Professor
Statistics
PhD, Purdue University, 1974

Chen, Willa W, Professor
Statistics
PhD, New York University, 2000

Cline, Daren B, Professor
Statistics
PhD, Colorado State University, 1983

Dabney, Alan R, Associate Professor
Statistics
PhD, University of Washington, 2006

Dahm, Paul F, Professor
Statistics
DVM, Iowa State University, 1979
PhD, Iowa State University, 1977

Hart, Jeffrey D, Professor
Statistics
PhD, Southern Methodist University, 1981

Hatfield, Lloyd K, Lecturer
Statistics
MBA, University of North Texas, 1980

Huang, Jianhua, Professor
Statistics
PhD, University of California, Berkeley, 1997

Johnson, Valen E, Professor
Statistics
PhD, University Of Chicago, 1989

Jones, Edward R, Executive Professor
Statistics
PhD, Virginia Tech, 1976

Jun, Mikyoung, Associate Professor
Statistics
PhD, University of Chicago, 2005

Katzfuss, Matthias S, Assistant Professor
Statistics
PhD, Ohio State University, 2011

Kincheloe, Faron, Visiting Professor
Statistics
MS, Baylor University, 2011

Kolodziej, Elizabeth Y, Senior Lecturer
Statistics
PhD, Texas A&M University, 2010

Liang, Hwa Chi, Senior Lecturer
Statistics
PhD, University of New Mexico, 2003

Long, James P, Assistant Professor
Statistics
PhD, University of California, Berkeley, 2013

Longnecker, Michael T, Professor
Statistics
PhD, Florida State University, 1976

Mallick, Bani K, Distinguished Professor
Statistics
PhD, University of Connecticut, 1994
Mueller-Harknett, Ursula U, Professor
Statistics
PhD, Universitat Bremen, Germany, 2005
PhD, University of Bremen, 1997

Newton, Howard J, Professor
Statistics
PhD, University at Buffalo, State University of New York, 1975

Pourahmadi, Mohsen, Professor
Statistics
PhD, Michigan State University, 1980

Sang, Huiyan, Associate Professor
Statistics
PhD, Duke University, 2008

Schmiediche, Henrik, Senior Lecturer
Statistics
PhD, Texas A&M University, 1993

Sheather, Simon J, Professor
Statistics
PhD, La Trobe University, 1986

Sherman, Michael, Professor
Statistics
PhD, University of North Carolina at Chapel Hill, 1992

Sinha, Samiran, Associate Professor
Statistics
PhD, University of Florida, 2004

Spiegelman, Clifford H, Distinguished Professor
Statistics
PhD, Northwestern University, 1976

Subbarao, Suhasini T, Associate Professor
Statistics
PhD, University of Bristol, 1999

Wang, Suojin, Professor
Statistics
PhD, University of Texas, Austin, 1988

Wehrly, Thomas E, Professor
Statistics
PhD, University of Wisconsin-Madison, 1976

Zhou, Lan, Associate Professor
Statistics
PhD, University of California, Berkeley, 1997

Minors

• Minor in Statistics (p. 568)

Statistics - Minor

The Department of Statistics offers a minor in Statistics. For additional information, contact Dr. Michael Longnecker (845-3141), or the Department of Statistics (http://www.stat.tamu.edu).

Program Requirements

Lower Division Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>STAT 211</td>
<td>Principles of Statistics I</td>
<td>3</td>
</tr>
<tr>
<td>STAT 212</td>
<td>Principles of Statistics II</td>
<td>3</td>
</tr>
</tbody>
</table>

Directed Upper Division Electives

Select three of the following: 1, 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>STAT 307</td>
<td>Sample Survey Techniques</td>
</tr>
<tr>
<td>STAT 407</td>
<td>Principles of Sample Surveys</td>
</tr>
<tr>
<td>STAT 408</td>
<td>Introduction to Linear Models</td>
</tr>
<tr>
<td>STAT 414</td>
<td>Mathematical Statistics I</td>
</tr>
<tr>
<td>or MATH 411</td>
<td>or Mathematical Probability</td>
</tr>
<tr>
<td></td>
<td>411</td>
</tr>
<tr>
<td>STAT 485</td>
<td>Directed Studies</td>
</tr>
<tr>
<td>STAT 489</td>
<td>Special Topics in…</td>
</tr>
<tr>
<td>MATH 411</td>
<td>Mathematical Probability</td>
</tr>
</tbody>
</table>

Total Semester Credit Hours 15

1 Cannot use both STAT 307 and STAT 407.
2 STAT 485 or STAT 489 must be approved by the Statistics Department.

Additional Requirements:

Students must make a grade of "C" or better in all courses.

Students must not be BS in APMS or BS in MATH major.

Substitutions for the minor must be approved by the Statistics Department.

University Studies Programs

The College of Science offers degrees in University Studies. A University Studies degree differs from a traditional “major” in that it consists of a concentration and two minors of 15-18 hours each. The University Studies degree format was created to provide students the flexibility to combine areas of study that are of special interest.

Majors

• Bachelor of Science in University Studies, Mathematics for Business Concentration (p. 568)
• Bachelor of Science in University Studies, Mathematics for Pre-Professionals Concentration (p. 569)
• Bachelor of Science in University Studies, Mathematics for Secondary Teaching Concentration (p. 569)
• Bachelor of Science in University Studies, Mathematics for Teaching Concentration (p. 570)

University Studies - BS, Mathematics for Business Concentration

The Bachelor of Science in University Studies, Mathematics for Business area of concentration consists of courses that are designed to give students who are both interested in business and mathematically inclined a way to combine both interests.

Program Requirements
University Studies - BS, Mathematics for Pre-Professionals Concentration

The Bachelor of Science in University Studies, Mathematics for Pre-Professionals area of concentration consists of courses that are designed to give students who are both interested in pre-professional programs and mathematically inclined a way to combine both interests.

Program Requirements

1. Must make a grade of 'C' or better.
2. Completion of four semesters of upper-level ROTC may be substituted for three hours of this requirement.
3. Hours must be in 100-499 courses not used elsewhere.

University Studies - BS, Science for Secondary Teaching Concentration

The BS in University Studies, Science for Secondary Teaching area of concentration consists of courses that give students desiring secondary-school teaching credentials a solid foundation in life, earth and physical sciences. In particular, the courses chosen encompass the science composite areas test by the State of Texas and TExES. These are the courses currently required for the science composite certificate.
ATMO 201 Weather and Climate  
ASTR 101 Basic Astronomy  
& ASTR 102 and Observational Astronomy  
CHEM 101 Fundamentals of Chemistry I  
& CHEM 111 and Fundamentals of Chemistry Laboratory I  
CHEM 102 Fundamentals of Chemistry II  
& CHEM 112 and Fundamentals of Chemistry Laboratory II  
GEOG 203 Planet Earth  
or GEOL 101 or Principles of Geology  
PHYS 201 College Physics  
or PHYS 218 or Mechanics  
PHYS 202 College Physics  

Select twelve hours from the following:  

Biol 318 Chordate Anatomy  
Biol 319 Integrated Human Anatomy and Physiology I  
Biol 320 Integrated Human Anatomy and Physiology II  
Biol 328 Plants and People  
Biol 335 Invertebrate Zoology  
Biol 357 Ecology  
Biol 401 Critical Writing in Biology  
Upper-level BIOL course for which prerequisites have been satisfied (p. 660)  
Chem 315 Quantitative Analysis  
& Chem and Quantitative Analysis Laboratory  
Chem 316 Quantitative Analysis  
& Chem and Quantitative Analysis  
Chem 362 Descriptive Inorganic Chemistry  
Chem 383 Chemistry of Environmental Pollution  
Chem 415 Analytical Chemistry  
Upper-level CHEM course for which prerequisites have been satisfied (p. 675)  
GEOG 331 Geomorphology  
GEOG 335 Pattern and Process in Biogeography  
GEOG 360 Natural Hazards  
GEOG Coastal Processes  
GEOG 370/Mars  
Upper-level GEOG course for which prerequisites have been satisfied (p. 796)  
Geol 301 Mineral Resources  
Geol 306 Sedimentology and Stratigraphy  
Geol 308 Integrated Earth Science  
Geol 309 Introduction to Geological Field Methods  
Geol 310 Planetary Geology  
Geol 311 Principles of Geological Writing  
Geol 352 GNSS in the Geosciences  
Geog 352  
Geol 410 Hydrogeology  
Geol 420 Environmental Geology  
Upper-level GEOl course for which prerequisites have been satisfied (p. 802)  

OCNG 401 Interdisciplinary Oceanography  
Upper-level OCNG course for which prerequisites have been satisfied (p. 916)  

University and College Requirements  
Communication (p. 20)  
Mathematics  
Select one of the following:  
MATH 151 Engineering Mathematics I  
MATH 147 Calculus I for Biological Sciences  
MATH 171 Analytic Geometry and Calculus  
Select one of the following:  
MATH 152 Engineering Mathematics II  
MATH 148 Calculus II for Biological Sciences  
MATH 172 Calculus  
Life and physical sciences  
ATMO 202 Weather and Climate Laboratory  
Biol 111 Introductory Biology I  
Biol 112 Introductory Biology II  
Language, philosophy and culture (with an ENGL prefix) (p. 21)  
Creative arts (p. 22)  
Social and behavioral sciences  
Select one of the following:  
Inst 210 Understanding Special Populations  
Inst 222 Foundations of Education in a Multicultural Society  
Soci 217 Introduction to Race and Ethnicity  
American history (p. 23)  
Pols 206 American National Government  
Pols 207 State and Local Government  
Minor 1  
Minor 2  
General Electives  

Total Semester Credit Hours  

University Studies - BS, Mathematics for Teaching Concentration  

The BS in University Studies, Mathematics for Teaching area of concentration consists of courses that are designed to give students desiring a secondary-school teaching credential a solid foundation in mathematics. In particular, the courses chosen encompass the mathematical areas tested by the State of Texas and TExES secondary mathematics examination. These are the courses currently required for the secondary mathematics teaching field at Texas A&M University.  

Program Requirements
<table>
<thead>
<tr>
<th>Subject</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 220</td>
<td>Foundations of Mathematics (^1)</td>
<td>3</td>
</tr>
<tr>
<td>MATH 375</td>
<td>Intermediate Real Analysis (^1)</td>
<td>3</td>
</tr>
<tr>
<td>MATH 376</td>
<td>Intermediate Abstract Algebra (^1)</td>
<td>3</td>
</tr>
<tr>
<td>MATH 403</td>
<td>Mathematics and Technology (^1)</td>
<td>3</td>
</tr>
<tr>
<td>MATH 467</td>
<td>Modern Geometry (^1)</td>
<td>3</td>
</tr>
<tr>
<td>STAT 211</td>
<td>Principles of Statistics I (^1)</td>
<td>3</td>
</tr>
<tr>
<td>MATH 304</td>
<td>Linear Algebra (^1)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>or MATH 323 or Linear Algebra</td>
<td></td>
</tr>
</tbody>
</table>

**University and College Requirements**

Communication (p. 20) 6
Mathematics 8

Select one of the following:
- MATH 151 Engineering Mathematics I
- MATH 147 Calculus I for Biological Sciences
- MATH 171 Analytic Geometry and Calculus

Select one of the following:
- MATH 152 Engineering Mathematics II
- MATH 148 Calculus II for Biological Sciences
- MATH 172 Calculus

PHYS 218 Mechanics 4

Life and physical sciences (p. 20) 5
Language, philosophy and culture (p. 21) 3
Creative arts (p. 22) 3
Social and behavioral sciences (p. 23) 3
American history (p. 23) 6

POLS 206 American National Government \(^2\) 3
POLS 207 State and Local Government \(^2\) 3

Minor 1 15-18
Minor 2 15-18

General Electives \(^3\) 19-25

**Total Semester Credit Hours** 120

\(^1\) Make a grade of 'C' or better.

\(^2\) Completion of four semesters of upper-level ROTC may be substituted for three hours of the requirement.

\(^3\) Hours of 100-499 courses not used elsewhere.
College of Veterinary Medicine and Biomedical Sciences

Administrative Officers
Dean - Eleanor M. Green, B.S., D.V.M.
Associate Dean for Professional Programs - Kenita S. Rogers, D.V.M., M.S.
Associate Dean for Research and Graduate Studies - Bhanu P. Chowdhary, M.V.Sc., Ph.D.
Associate Dean for Undergraduate Education - Evelyn Tiffany-Castiglioni, Ph.D.
Assistant Dean of Biomedical Sciences - Elizabeth Crouch, Ph.D.
Assistant Dean for Finance and Administration - Belinda S. Hale, M.B.A.
Director of Student Services for Professional Programs - Leslie A. Fiechtner, M.S.

General Statement
The College of Veterinary Medicine and Biomedical Sciences consists of five academic departments: Veterinary Integrative Biosciences, Veterinary Large Animal Clinical Sciences, Veterinary Pathobiology, Veterinary Physiology and Pharmacology, and Veterinary Small Animal Clinical Sciences. Each department is administered by a department head, who is responsible to the Dean of Veterinary Medicine and Biomedical Sciences for all programs assigned or developed in the department, including teaching, research, extension and service.

A Veterinary Medical Teaching Hospital and Field Service Clinic are operated within the College to provide clinical laboratories for the veterinary medical educational program.

An extensive research program in animal health and disease is conducted by the faculty and staff of the college, and a substantial number of the teaching faculty members are engaged in research.

A veterinary extension program carries research information to veterinarians, animal owners, and others in the state and nation with the least possible delay. The faculty makes research information available to the students in the classroom and laboratories in a timely manner.

The typical land-grant institutional mandate of teaching, research, patient care and service provides the organizational framework necessary to meet the dynamics in the ever-changing field of veterinary medicine.

Graduate programs leading to the Master of Science and Doctor of Philosophy degrees are available in the departments of the College of Veterinary Medicine and Biomedical Sciences. The programs are research-oriented but sufficiently flexible to permit intensive training in many areas of special training. Clinical specialty training programs are also available. These programs are designed to provide effective training in the areas of professional specialization.

Majors

College of Veterinary Medicine and Biomedical Sciences

• Bachelor of Science in Biomedical Sciences (p. 573)
• Bachelor of Science in University Studies, Biomedical Sciences Concentration (p. 581)

Minors

College of Veterinary Medicine and Biomedical Sciences

• Biomedical Sciences Minor (p. 575)

Certificates

College of Veterinary Medicine and Biomedical Sciences

• International Certificate in Cultural Competency and Communications in Spanish (p. 581)

Department of Veterinary Physiology and Pharmacology

• Biomedical Research and Development Certificate (p. 581)

Masters

College of Veterinary Medicine and Biomedical Sciences

• Master of Science in Biomedical Sciences (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/veterinary-medicine-biomedical-sciences/interdepartmental/biomedical-sciences-ms)
• Master of Science in Laboratory Animal Medicine (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/veterinary-medicine-biomedical-sciences/interdepartmental/laboratory-animal-medicine-ms)
• Master of Science in Science and Technology Journalism (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/veterinary-medicine-biomedical-sciences/interdepartmental/science-technology-journalism-ms)

Department of Veterinary Integrative Biosciences

• Master of Science in Veterinary Public Health - Epidemiology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/veterinary-medicine-biomedical-sciences/veterinary-integrative-biosciences/veterinary-public-health-epidemiology-ms)

Doctoral
College of Veterinary Medicine and Biomedical Sciences

- Doctor of Philosophy in Biomedical Sciences (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/veterinary-medicine-biomedical-sciences/interdepartmental/biomedical-sciences-phd)

Department of Veterinary Pathobiology

- Doctor of Philosophy in Veterinary Pathobiology (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/veterinary-medicine-biomedical-sciences/veterinary-pathobiology/phd)

Professional

College of Veterinary Medicine and Biomedical Sciences

- Doctor of Veterinary Medicine in Veterinary Medicine (http://catalog.tamu.edu/graduate/colleges-schools-interdisciplinary/veterinary-medicine-biomedical-sciences/interdepartmental/dvm)

Biomedical Sciences - BS

Admission

1. A Biomedical Sciences (BIMS) major will be admitted into the upper-level courses according to the following criteria:
   a. Completion of a set of Common Body of Knowledge (CBK) courses (35 hours to include BIOL 111, BIOL 112, CHEM 101/111, CHEM 102/112, CHEM 227/237, CHEM 228/238, PHYS 201, PHYS 202 and MATH 131) with a grade of C or better in each course taken at Texas A&M. Normally, for admission to BIMS upper-level courses, a student may have attempted a CBK course no more than twice.
   b. A minimum of 55 completed semester hours with a cumulative resident Grade Point Ratio (GPR) of 2.5 or better. Process: Each student upon completing 55–65 semester credit hours must have a degree audit to verify upper-level eligibility.

2. The Biomedical Sciences Program will continue to accept changes of major into BIMS according to current Texas A&M University policy, but restrict changes of major into the upper-level courses (BIMS) according to the criteria listed in item 1. Students in other majors requesting a change of major to the BIMS program must also fulfill the criteria in item 1. In addition, the dean must verify availability of resources necessary to insure the student’s full-time enrollment in required upper-level courses prior to admission to upper-level status. If such courses are not available, the student will be denied admission to Biomedical Sciences.

3. To enter BIMS upper-level courses, transfer students must have:
   a. A minimum GPR of 3.0 in CBK courses with a grade of B or better in each completed course if taken at a 2-year college. A grade of C is accepted from a 4-year college.
   b. Transfer students admitted under another major and wishing to change into BIMS must complete one semester of graded coursework at Texas A&M University with a cumulative resident GPR of 2.5 and must fulfill the criteria in item 1.
   c. Texas A&M change of majors must have at least 55 semester credit hours with a minimum cumulative GPR of 3.0.

4. Students seeking readmission will be considered on a case-by-case basis, according to current catalog policy. No quotas will be placed on readmission; however, the decision to readmit will be dependent on resource availability and University policy.

5. Any BIMS student admitted to upper-level courses who then falls below the 2.5 GPR requirement will not be considered in good academic standing in their major and will be placed on college probation. All Biomedical Sciences majors must follow established probation rules for the Biomedical Sciences Program.

6. The Dean, Director or Department Head will reserve the right to waive CBK or GPR requirements within the criteria established in Texas A&M University Student Rules.

7. No courses other than BIMS 481, BIMS 484, VIBS 310, VIBS 311, or research/directed studies credits can be taken S/U to be used in the degree plan.

8. BIMS probation is determined at the end of the Spring semester. Students not meeting acceptable GPR requirements (2.5 BIMS majors with 55 or more hours or 2.0 area of concentration (USVM), BIMS majors with less than 55 hours) will be required to attend Texas A&M University that summer and repeat courses as needed to raise their GPR.

9. Students may only attempt CVM courses a total of three (3) times.

Applied Science Option

Biomedical Sciences is a broad field of applied biology that is directed toward understanding health and disease. The curriculum is designed to provide a strong four-year education that emphasizes versatility of the graduate in the biological and medical sciences. A highly effective counseling program assists the students with the development of an individualized approach and course package that orients and prepares the students for entry into the medical, allied health field or graduate program of their choice. Such an approach enhances their educational experiences, improves their placement in professional and graduate programs, and facilitates their entry into the biomedical science job market.

Biomedical Sciences graduates enter professional programs in human medicine, veterinary medicine, dentistry, osteopathy, podiatry, optometry, and pharmacy. Some become medical technologists, physician assistants, nurses, and laboratory and research technicians. Others pursue radiation technology, hospital administration, and a wide variety of health-related fields. Many Biomedical Sciences students continue their education in graduate schools and specialize in various biology- and medicine-related disciplines. Other graduates are employed by clinical practices, industrial companies, government agencies, private foundations, public schools, colleges and certain aspects of business. Positions are available in pharmaceutical and drug marketing, research equipment manufacture and sales, food safety, biomedical research, disease control, zoonoses and epidemiology, laboratory animal care, zoo and aquatic animal supervision, health-related inspection and regulatory work. The BS in Biomedical Sciences is also awarded to students who complete the three year Early Admission Option to Professional Schools and one year of professional school.

Faculty

Benson, M Douglas, Assistant Professor
Biomedical Sciences
PhD, University of Michigan, 2000

Dechow, Paul C, Professor
Biomedical Sciences
PhD, University of Chicago, 1980
College of Veterinary Medicine and Biomedical Sciences

Honeyman, Allen L, Associate Professor
Biomedical Sciences
PhD, University of Kansas, 1988

Program Requirements

First Year

Fall

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tr>
<td>BIMS 101</td>
<td>Introduction to Biomedical Science</td>
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</tr>
<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 111</td>
<td>and Fundamentals of Chemistry Laboratory I</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics elective (p. 20)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Social and behavioral sciences elective (p. 23)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Term Semester Credit Hours</strong></td>
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Spring

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<tr>
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<th>Course Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>BIOL 112</td>
<td>Introductory Biology II</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 102</td>
<td>Fundamentals of Chemistry II</td>
<td>4</td>
</tr>
<tr>
<td>&amp; CHEM 112</td>
<td>and Fundamentals of Chemistry Laboratory II</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
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</tr>
<tr>
<td>MATH 131</td>
<td>Mathematical Concepts—Calculus</td>
<td>3</td>
</tr>
<tr>
<td>MATH 142</td>
<td>Business Mathematics II</td>
<td>3</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 171</td>
<td>Analytic Geometry and Calculus</td>
<td>3</td>
</tr>
<tr>
<td><strong>Term Semester Credit Hours</strong></td>
<td><strong>14</strong></td>
<td></td>
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Second Year

Fall

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<tr>
<th>Course Code</th>
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</thead>
<tbody>
<tr>
<td>CHEM 227</td>
<td>Organic Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 237</td>
<td>Organic Chemistry Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>HIST 105</td>
<td>History of the United States</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 201</td>
<td>College Physics</td>
<td>4</td>
</tr>
<tr>
<td>POLS 206</td>
<td>American National Government</td>
<td>3</td>
</tr>
<tr>
<td>Creative arts elective (p. 22)</td>
<td>3</td>
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<td><strong>Term Semester Credit Hours</strong></td>
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Spring

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<tr>
<td>CHEM 228</td>
<td>Organic Chemistry II</td>
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<td>&amp; CHEM 238</td>
<td>and Organic Chemistry Laboratory</td>
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<tr>
<td>HIST 106</td>
<td>History of the United States</td>
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<td>PHYS 202</td>
<td>College Physics</td>
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<td>POLS 207</td>
<td>State and Local Government</td>
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<td>Language, philosophy and culture elective (p. 21)</td>
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Third Year

Fall

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<tr>
<td>BICH 410</td>
<td>Comprehensive Biochemistry I</td>
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<tr>
<td>BIMS 320/GENE 320</td>
<td>Biomedical Genetics</td>
<td>3</td>
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<tr>
<td>VIBS 305</td>
<td>Biomedical Anatomy</td>
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<td>Select a BIMS directed elective from the list below</td>
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Fourth Year

Fall

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<td>VIBS 311</td>
<td>Biomedical Explorations through Narrative</td>
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<td>STAT 302</td>
<td>Statistical Methods</td>
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<td>Free elective</td>
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<tr>
<td>VTPP 423</td>
<td>Biomedical Physiology I</td>
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<td>Select BIMS directed electives from the list below</td>
<td>10</td>
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<tr>
<td><strong>Term Semester Credit Hours</strong></td>
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<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
</tr>
</thead>
</table>

Total Semester Credit Hours: 120

1 Must be chosen in consultation with BIMS academic advisor.
2 Check with your BIMS academic advisor to select the correct courses.

In satisfying the required 24 hours of BIMS directed electives and free electives, all 285/485 courses may not exceed 6 credit hours and all 289/489 courses may not exceed 9 credit hours. A 289/489 course used as a free elective may not exceed 3 hours. A 291/491 course may not exceed 3 hours credit.

Directed Electives

BIMS directed electives are courses that constitute the major offered by the College of Veterinary Medicine and Biomedical Sciences and those approved for biomedical science electives. A student may choose 26 semester credits from the following partial list of courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>BIMS 110</td>
<td>One Health in Action</td>
<td>1</td>
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<tr>
<td>BIMS 201</td>
<td>Introduction to Phenotypic Expression in the</td>
<td>2</td>
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<tr>
<td>Context of Human Medicine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIMS 289</td>
<td>Special Topics in...</td>
<td>1-4</td>
</tr>
<tr>
<td>BIMS 291</td>
<td>Research</td>
<td>0-4</td>
</tr>
<tr>
<td>BIMS 392</td>
<td>Cooperative Education in Biomedical Science</td>
<td>2</td>
</tr>
<tr>
<td>BIMS 481</td>
<td>Seminar in Biomedical Science</td>
<td>1</td>
</tr>
<tr>
<td>BIMS 405/GENE 405</td>
<td>Mammalian Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BIMS 421</td>
<td>Advanced Human Genetics</td>
<td>3</td>
</tr>
<tr>
<td>BIMS 421</td>
<td>GEN 421</td>
<td>3</td>
</tr>
<tr>
<td>BIMS 452/GENE 452</td>
<td>Modifying Mammalian Genomes for Biomedical</td>
<td>3</td>
</tr>
<tr>
<td>Research</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIMS 484</td>
<td>Biomedical Science Field Experience</td>
<td>2</td>
</tr>
<tr>
<td>BIMS 489</td>
<td>Special Topics in...</td>
<td>1-4</td>
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<tr>
<td>VTPB 212</td>
<td>Genetics in the News</td>
<td>3</td>
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</tbody>
</table>

Select a BIMS directed elective from the list below

Select a BIMS directed elective from the list below
### Biomedical Sciences - Minor

Students declaring a Biomedical Sciences (BIMS) minor must declare the minor through the BIMS academic advising office.

**Requirements to declare BIMS minor:**
- Must have a 2.0 TAMU GPA
- Must be declared before 75 hours are completed

**Program Requirements**

A selection from among the following courses will constitute a minor field of study. The following 15 hours of course work are required. Proper classification must be met for the course level being taken.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tr>
<td>VTPB 221</td>
<td>Great Diseases of the World</td>
<td>3</td>
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<tr>
<td>VTPB 301/</td>
<td>VTPB 327 Wildlife Diseases</td>
<td>3</td>
</tr>
<tr>
<td>WFSC 327</td>
<td></td>
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<tr>
<td>VTPB 303</td>
<td>Medical Communication in the International Community</td>
<td>2</td>
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<tr>
<td>VTPB 407</td>
<td>Advanced Veterinary Microbiology Laboratory</td>
<td>1-3</td>
</tr>
<tr>
<td>VTPB 408</td>
<td>Clinical Microbiology</td>
<td>4</td>
</tr>
<tr>
<td>VTPB 409</td>
<td>Introduction to Immunology</td>
<td>3</td>
</tr>
<tr>
<td>VTPB 410</td>
<td>Cell Mechanisms of Disease</td>
<td>3</td>
</tr>
<tr>
<td>VTPB 412</td>
<td>Techniques of Clinical Pathology</td>
<td>4</td>
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<tr>
<td>VTPB 415</td>
<td>Immunogenetics and Comparative Immunology</td>
<td>3</td>
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<tr>
<td>VTPB 421</td>
<td>Bacterial Diseases of Humans and Animals</td>
<td>3</td>
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<tr>
<td>VTPB 438</td>
<td>Biomedical Virology</td>
<td>3</td>
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<tr>
<td>VTPB 452</td>
<td>Clinical Veterinary Mycology</td>
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<td>VTPB 454/</td>
<td>VTPB 454/ MARB 454 Ornamental Fish Health Management</td>
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<td>ANSC 107 &amp;</td>
<td>ANSC 108 General Animal Science</td>
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<tr>
<td>VTPB 223</td>
<td>Design of Experiments for Physiology Research</td>
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<td>VTPP 224</td>
<td>In Vitro Experimentation for Physiology Research</td>
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<tr>
<td>VTPP 234</td>
<td>Design of Models for Physiology Research</td>
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<tr>
<td>VTPP 235</td>
<td>Analysis and Validation of Models for Physiology Research</td>
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<td>VTPP 281</td>
<td>Seminar</td>
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<td>VTPP 401</td>
<td>History of Human and Veterinary Medicine in Europe</td>
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<td>VTPP 424/</td>
<td>VIBS 424 Biomedical Neuroendocrinology and Endocrine Disorders</td>
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<td>VIBS 425</td>
<td>Pharmacology</td>
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<td>VTPP 427</td>
<td>Biomedical Physiology II</td>
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<td>VTPP 429</td>
<td>Introduction to Toxicology</td>
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<td>VTPP 438</td>
<td>Analysis of Genomic Signals</td>
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<td>VTPP 439</td>
<td>Non-Coding RNA’s</td>
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<td>VTPP 444</td>
<td>Practicum in Biomedical Research</td>
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<td>Stem Cell Physiology</td>
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<td>Fetal and Embryo Physiology</td>
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<td>VIBS 204</td>
<td>Fundamentals of Food Toxicology and Safety</td>
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<td>VIBS 222</td>
<td>Great Poisonings of the World</td>
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<td>VIBS 277/</td>
<td>NRSC 277 Introduction to Neuroscience</td>
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<td>VIBS 343</td>
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<td>VIBS 401</td>
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<td>VIBS 404</td>
<td>Food Toxicology and Safety</td>
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<td>VIBS 408</td>
<td>Neuroscience and Religion</td>
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<td>VIBS 411</td>
<td>Tumor Cell Biology and Carcinogenesis</td>
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<td>VIBS 413</td>
<td>Introduction to Epidemiology</td>
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<td>Computer Applications in Public Health Research</td>
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<td>NRSC 450 Mammalian Functional Neuroanatomy</td>
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GENE 431/ Molecular Genetics
BICH 431 and Laboratory in Molecular Genetics
& GENE 432/BICH 432

GENE 450 Recombinant DNA and Biotechnology
VIBS 343 Histology
VIBS 404 Food Toxicology and Safety
VIBS 420 Computer Applications in Public Health Research
VIBS 432 Public Health Practices
VIBS 443 Biology of Mammalian Cells and Tissues
VIBS 450/ Mammalian Functional Neuroanatomy
NRSC 450
VIBS 485 Directed Studies
VIBS 489 Special Topics in...
VTPB 301/ Wildlife Diseases
WFSC 327
VTPB 303 Medical Communication in the International Community
VTPB 334 Poultry Diseases
VTPB 408 Clinical Microbiology
VTPB 409 Introduction to Immunology
VTPB 410 Cell Mechanisms of Disease
VTPB 412 Techniques of Clinical Pathology
VTPB 421 Bacterial Diseases of Humans and Animals
VTPB 438 Biomedical Virology
VTPB 452 Clinical Veterinary Mycology
VTPB 454/ Ornamental Fish Health Management
MARB 454
VTPB 485 Directed Studies
VTPB 487/ Biomedical Parasitology
BIOL 487
VTPB 489 Special Topics in...
VTPP 424/ Biomedical Neuroendocrinology and Endocrine Disorders
VIBS 424 Disorders
VTPP 425 Pharmacology
VTPP 427 Biomedical Physiology II
VTPP 429 Introduction to Toxicology
VTPP 485 Directed Studies
VTPP 489 Special Topics in...

Total Semester Credit Hours 15

1 BIMS Directed Electives are taken in consultation with a BIMS Academic Advisor.

Department of Veterinary Integrative Biosciences

http://vetmed.tamu.edu/vibs

Faculty

Abbott, Louise C, Professor
Vet Integrative Biosciences
DVM, Washington State University, 1988
PhD, University of Washington, 1982

Arosh, Joe A, Associate Professor
Vet Integrative Biosciences
DVM, Universite Laval, 2004
PhD, Laval University, 2003

Arosh, Sakhila Banu, Assistant Professor
Vet Integrative Biosciences
PhD, University of Madras, 2002

Budke, Christine M, Associate Professor
Vet Integrative Biosciences
PhD, Philosophisch-Naturwissenschaftliche Fakultat der Universitat Basel, 2005
DVM, Purdue University, 2001
DVM, Purdue University, 2001

Burghardt, Robert C, Professor
Vet Integrative Biosciences
PhD, Wayne State University, 1976

Cai, Jing, Assistant Professor
Vet Integrative Biosciences
PhD, University of Hong Kong, 2006

Cannon, Marvin, Senior Professor
Vet Integrative Biosciences
PhD, Texas A&M University, 2005
DVM, Texas A&M University, 1996

Chiu, Weihsueh A, Professor
Vet Integrative Biosciences
PhD, Princeton University, 1998

Cothran, Ernest G, Clinical Professor
Vet Integrative Biosciences
PhD, University of Oklahoma, 1982

Cummings, Kevin J, Assistant Professor
Vet Integrative Biosciences
PhD, Cornell University, 2010

Curley, Kevin O, Instructional Assistant Professor
Vet Integrative Biosciences
PhD, Texas A&M University, 2012
DVM, Cornell University, 1996

Dees, William L, Professor
Vet Integrative Biosciences
DVM, Texas A&M University, 1982

Frank-Cannon, Tamy C, Clinical Assistant Professor
Vet Integrative Biosciences
PhD, Texas A&M University, 2005
DVM, Texas A&M University, 1996

Gastel, Barbara J, Professor
Vet Integrative Biosciences
MD, John Hopkins University, 1978
Hamer, Sarah A, Assistant Professor
Vet Integrative Biosciences
DVM, Michigan State University, 2011
PhD, Michigan State University, 2010

Herman, Cheryl L, Clinical Associate Professor
Vet Integrative Biosciences
DVM, University of Saskatchewan, Canada, 1987

Hiney, Jill K, Research Assistant Professor
Vet Integrative Biosciences
PhD, Texas A&M University, 1996

Hoffman, Anton G, Clinical Professor
Vet Integrative Biosciences
PhD, Texas A&M University, 1992
DVM, Texas A&M University, 1986

Johnson, Gregory A, Professor
Vet Integrative Biosciences
PhD, University of Wyoming, 1997

Johnson, Larry, Professor
Vet Integrative Biosciences
PhD, Colorado State University, 1978

Keefe, Lisa M, Instructional Assistant Professor
Vet Integrative Biosciences
MS, Purdue University, 2008

Klemm, William R, Senior Professor
Vet Integrative Biosciences
PhD, University of Notre Dame, 1963

Ko, Gladys Y, Associate Professor
Vet Integrative Biosciences
PhD, Kent State University, 1996

Korich, Jodi A, Clinical Assistant Professor
Vet Integrative Biosciences
DVM, Cornell University, 1997

Kornegay, Joe N, Professor
Vet Integrative Biosciences
PhD, University of Georgia, 1982

Langford, Candice L, Research Assistant Professor
Vet Integrative Biosciences
PhD, Texas A&M University, 2006

Li, Jianrong, Associate Professor
Vet Integrative Biosciences
PhD, University of Hawaii, 1997

Li, Qinglei, Assistant Professor
Vet Integrative Biosciences
PhD, Harbin Medical University, 2001

Mouneimne, Roula, Research Professor
Vet Integrative Biosciences
PhD, Claude-Bernard University, 1984

Murphy, William J, Professor
Vet Integrative Biosciences
PhD, University of Tulsa, 1997

Phillips, Timothy D, Professor
Vet Integrative Biosciences
PhD, University of Southern Mississippi, 1975

Pine, Michelle D, Clinical Associate Professor
Vet Integrative Biosciences
PhD, Texas A&M University, 2002
DVM, University of Missouri-Columbia, 1991

Porter, Weston W, Associate Professor
Vet Integrative Biosciences
PhD, Texas A&M University, 1997

Raudsepp, Terje, Associate Professor
Vet Integrative Biosciences
PhD, Swedish University of Agricultural Sciences, 1999

Ruoff, Lynn M, Clinical Associate Professor
Vet Integrative Biosciences
DVM, Colorado State University, 1975

Russell, Leon H, Senior Professor
Vet Integrative Biosciences
PhD, Texas A&M University, 1965
DVM, University of Missouri, 1956

Rusyn, Ivan I, Professor
Vet Integrative Biosciences
PhD, University of North Carolina at Chapel Hill, 2000
MD, Ukrainian State Medical University, 1994

Samollow, Paul, Professor
Vet Integrative Biosciences
PhD, Oregon State University, 1979

Skow, Loren C, Professor
Vet Integrative Biosciences
PhD, Texas A&M University, 1976

Tayce, Jordan D, Instructional Assistant Professor
Vet Integrative Biosciences
DVM, Texas A&M University, 2008

Taylor, Robert J, Research Professor
Vet Integrative Biosciences
PhD, Texas A&M University, 1987

Tiffany-Castiglion, E, Professor
Vet Integrative Biosciences
PhD, University of Texas Medical Branch at Galveston, 1979

Venkatraj, Vijayanagaram S, Clinical Assistant Professor
Vet Integrative Biosciences
PhD, New York University, 1992

Welsh, Christabel J, Professor
Vet Integrative Biosciences
PhD, West Virginia University, 2014

Waltz, Micah J, Lecturer
Vet Integrative Biosciences
MS, West Virginia University, 2014

Welsh, Christabel J, Professor
Vet Integrative Biosciences
PhD, London University, 1981
Department of Veterinary Large Animal Clinical Sciences

http://vetmed.tamu.edu/vlcs

Department of Veterinary Pathobiology

http://vetmed.tamu.edu/vtpb

Faculty

Adams, Leslie G, Senior Professor
Veterinary Pathobiology
DVM, Texas A&M University, 1968

Arenas, Angela M, Assistant Professor
Veterinary Pathobiology
PhD, Texas A&M University, 2007
DVM, La Salle University, Columbia, 2002

Ball, Judith M, Associate Professor
Veterinary Pathobiology
PhD, Louisiana State University, 1990

Brightsmith, Donald J, Assistant Professor
Veterinary Pathobiology
PhD, Duke University, 1999

Clubb, Fred J, Clinical Professor
Veterinary Pathobiology
PhD, University of Alabama, 1983
DVM, Auburn University, 1971

Cook, Walter E, Clinical Associate Professor
Veterinary Pathobiology
PhD, University of Wyoming, 1999
DVM, Universtis of California-Davis, 1994

Craig, Thomas M, Professor
Veterinary Pathobiology
PhD, Texas A&M University, 1975
DVM, Colorado State University, 1961
PhD, Texas A&M University, 1961

Criscitiello, Michael F, Associate Professor
Veterinary Pathobiology
PhD, University of Miami, 2003

Dai, Yuan, Research Assistant Professor
Veterinary Pathobiology
PhD, Duke University, 2006

Dangoudoubiyam, Sriveny, Assistant Professor
Veterinary Pathobiology
PhD, Purdue University, 2009
DVM, Pondicherry University, India, 2000

Davis, Donald S, Associate Professor
Veterinary Pathobiology
PhD, Texas A&M University, 1979

Derr, James N, Professor
Veterinary Pathobiology
PhD, Texas A&M University, 1990

Dindot, Scott V, Associate Professor
Veterinary Pathobiology
PhD, Texas A&M University, 2003

Edwards, John F, Professor
Veterinary Pathobiology
PhD, Cornell University, 1979
DVM, The Ohio State University, 1974

Esteve-Gasent, Maria D, Assistant Professor
Veterinary Pathobiology
PhD, Universidad de Valencia, Spain, 2003

Ficht, Thomas A, Professor
Veterinary Pathobiology
PhD, Columbia University, 1980

Holman, Patricia J, Research Associate Professor
Veterinary Pathobiology
PhD, Texas A&M University, 1994

Jeter, Elizabeth A, Lecturer
Veterinary Pathobiology
DVM, Texas A&M University, 1982

Johnson, Mark C, Clinical Associate Professor
Veterinary Pathobiology
DVM, Texas A&M University, 1988

Kier, Ann B, Professor
Veterinary Pathobiology
DVM, Texas A&M University, 1974
PhD, University of Missouri - Columbia, 1979
DVM, Texas A&M University, 1974

Krecek, Rosina C, Visiting Professor
Veterinary Pathobiology
JD, University of Pretoria, 1985

Lawhon, Sara D, Associate Professor
Veterinary Pathobiology
PhD, North Carolina State University, 2003
DVM, Texas A&M University, 1997

Levine, Gwendolyn J, Clinical Assistant Professor
Veterinary Pathobiology
DVM, Texas A&M University, 2006

Logan, Linda L, Professor
Veterinary Pathobiology
PhD, University of California, Davis, 1987
DVM, Texas A&M University, 1976

Lupiani, Blanca M, Professor
Veterinary Pathobiology
PhD, University of Maryland, 1994
Mansell, Karen J, Clinical Professor
Veterinary Pathobiology
DVM, University of Florida, 1989

Mulenga, Albert, Associate Professor
Veterinary Pathobiology
DVM, Hokkaido University, 1999

Musser, Jeffrey M, Clinical Professor
Veterinary Pathobiology
PhD, North Carolina State University, 2000
DVM, VA-MD Regional College of Veterinary Medicine, 1989

Mwangi, Waithaka, Associate Professor
Veterinary Pathobiology
PhD, Washington State University, 2002

Nabity, Mary B, Assistant Professor
Veterinary Pathobiology
PhD, Texas A&M University, 2010
DVM, Cornell University, 2002

Omran, Mohamed T, Clinical Assistant Professor
Veterinary Pathobiology
PhD, Texas A&M University, 1995

Payne, Susan L, Associate Professor
Veterinary Pathobiology
PhD, Louisiana State University, 1983

Pinedo, Pablo J, Assistant Professor
Veterinary Pathobiology
PhD, University of Florida, 2008
DVM, University of Chile, 1993

Pool, Roy R, Clinical Professor
Veterinary Pathobiology
DVM, University of California, Davis, 1967

Porter, Brian F, Clinical Associate Professor
Veterinary Pathobiology
DVM, Texas A&M University, 1992

Rech, Raquel R, Clinical Assistant Professor
Veterinary Pathobiology
DVM, Federal University of Santa Maria, Brazil, 2007

Reddy, Sanjay M, Professor
Veterinary Pathobiology
PhD, University of Maryland, 1994
DVM, Andhra Pradesh Agricultural University, India, 1986

Rivera, Gonzalo M, Associate Professor
Veterinary Pathobiology
PhD, Cornell University, 2002
DVM, National University of Rio Cuarto, Argentina, 1988

Rodrigues Hoffmann, Aline, Assistant Professor
Veterinary Pathobiology
PhD, Texas A&M University, 2011
DVM, Universidade Federal de Santa, Brazil, 2004

Rogovskyy, Artem S, Clinical Assistant Professor
Veterinary Pathobiology
PhD, Washington State University, 2014
DVM, National Agricultural University, 2001

Russell, Karen E, Professor
Veterinary Pathobiology
DVM, VA-MD Regional College of Veterinary Medicine, 1990
PhD, North Carolina State University, 1997
DVM, VA-MD Regional College of Veterinary Medicine, 1990

Scott, Harvey M, Professor
Veterinary Pathobiology
DVM, University of Saskatchewan, Canada, 1988
PhD, University of Guelph, Canada, 1998

Seabury, Christopher M, Associate Professor
Veterinary Pathobiology
PhD, Texas A&M University, 2004

Smith, Roger, Professor
Veterinary Pathobiology
PhD, Baylor College of Medicine, 1984
DVM, Texas A&M University, 1977

Snowden, Karen F, Professor
Veterinary Pathobiology
PhD, North Carolina State University, 1988
DVM, Auburn University, 1979

Stoica, Gheorghe, Professor
Veterinary Pathobiology
PhD, Michigan State University, 1984
DVM, Institute of Agronomy, Romania, 1966

Threadgill, David W, Professor
Veterinary Pathobiology
PhD, Texas A&M University, 1989

Threadgill, Deborah S, Assistant Professor
Veterinary Pathobiology
PhD, Texas A&M University, 1990

Tizard, Ian R, Professor
Veterinary Pathobiology
PhD, University of Cambridge, 1969
DVM, University of Edinburgh, 1965

Waghela, Suryakant D, Clinical Assistant Professor
Veterinary Pathobiology
PhD, Washington State University, 1989

Weeks, Bradley R, Professor
Veterinary Pathobiology
PhD, Kansas State University, 1988
DVM, Oklahoma State University, 1983
DVM, Oklahoma State University, 1983

Womack, James E, Distinguished Professor
Veterinary Pathobiology
PhD, Oregon State University, 1968

Zhu, Guan, Professor
Veterinary Pathobiology
PhD, University of Georgia, 1993
### Department of Veterinary Physiology and Pharmacology

http://vetmed.tamu.edu/vtpp

#### Faculty

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<tr>
<th>Name</th>
<th>Position</th>
<th>Department</th>
<th>Education Details</th>
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<tr>
<td>Bailey, Everett M Jr.</td>
<td>Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, Iowa State University, 1968 DVM, Texas A&amp;M University, 1964</td>
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<tr>
<td>Blue-Mclendon, Alice</td>
<td>Clinical Assistant Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>DVM, Texas A&amp;M University, 1989</td>
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<tr>
<td>Dongaonkar, Ranjeet M</td>
<td>Assistant Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, Texas A&amp;M University, 2008</td>
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<tr>
<td>Fajt, Virginia R</td>
<td>Clinical Associate Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, Iowa State University, 2000 DVM, Auburn University, 1995</td>
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<tr>
<td>Golding, Michael C</td>
<td>Associate Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, Texas A&amp;M University, 2003</td>
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<td>Han, Guichun</td>
<td>Clinical Assistant Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, Dalian Medical University, China, 2002</td>
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<tr>
<td>Heaps, Cristine L</td>
<td>Associate Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, University of Missouri, 1999</td>
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<tr>
<td>Herman, James D</td>
<td>Clinical Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, Texas A&amp;M University, 1995 DVM, Texas A&amp;M University, 1989</td>
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<td>Hinrichs, Katrin</td>
<td>Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, University of Pennsylvania, 1988</td>
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<tr>
<td>Ivanov, Ivan V</td>
<td>Clinical Associate Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, University of South Florida, 1999</td>
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<tr>
<td>Jones, Daniel H</td>
<td>Associate Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>DVM, University of Guelph, 1976</td>
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<tr>
<td>Kraemer, Duane C</td>
<td>Senior Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, Agricultural &amp; Mechanical College (TAMU), 1966 DVM, Texas A&amp;M University, 1966</td>
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<tr>
<td>Laine, Glen A</td>
<td>Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, Texas A&amp;M University, 1979</td>
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<td>Long, Charles R</td>
<td>Associate Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, University of Massachusetts, 1996</td>
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<td>Muneoka, Ken</td>
<td>Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, University of California, Irvine, 1983</td>
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<tr>
<td>Newell-Fugate, Anne E</td>
<td>Assistant Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, University of Illinois at Urbana-Champaign, 2012 DVM, North Carolina State, 2004</td>
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<tr>
<td>Quick, Christopher M</td>
<td>Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, Rutgers University, 1999</td>
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<tr>
<td>Robles Emmanuell, Juan C</td>
<td>Clinical Assistant Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>DVM, University of Wisconsin, 2005</td>
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<td>Safe, Stephen H</td>
<td>Distinguished Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, University of Oxford, 1965</td>
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<td>Schroeder, Friedhelm</td>
<td>Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, Michigan State University, 1973</td>
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<td>Stallone, John N</td>
<td>Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, University of Arizona, 1984</td>
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<tr>
<td>Stewart, Randolph H</td>
<td>Clinical Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, Texas A&amp;M University, 1997 DVM, Texas A&amp;M University, 1983</td>
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<tr>
<td>Tian, Yanan</td>
<td>Associate Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, Rutgers University, 1993</td>
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<tr>
<td>Washburn, Shannon E</td>
<td>Clinical Assistant Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, Texas A&amp;M University, 2010 DVM, Texas A&amp;M University, 1994</td>
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<tr>
<td>Wassser, Jeremy S</td>
<td>Associate Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, Indiana University, 1985</td>
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<tr>
<td>Westhusin, Mark E</td>
<td>Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, Texas A&amp;M University, 1986</td>
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<tr>
<td>Zhou, Beiyan</td>
<td>Associate Professor</td>
<td>Vet Physiology &amp; Pharmacology</td>
<td>PhD, Northwestern University, 2004</td>
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</tbody>
</table>

#### Certificates

- Biomedical Research and Development Certificate (p. 581)
Biomedical Research and Development - Certificate

The Biomedical Research Certificate, offered by the Department of Veterinary Physiology and Pharmacology, will provide students the opportunity to gain advanced training in biomedical research. Students in the Certificate Program will gain a broader understanding of the creation, evaluation, and dissemination of new knowledge while performing publishable original biomedical research within a research-intensive community. The Biomedical Research Certificate Program requires a minimum of 18-credit hours in designated courses, each of which includes engagement in inquiry-based research. Specific certificate requirements are available in the Biomedical Sciences Office and the Department of Veterinary Physiology and Pharmacology (http://vetmed.tamu.edu/vtpp).

Program Requirements

VTPP 123 Foundations of Physiology 3
VTPP 491 Research 6
VTPP 444 Practicum in Biomedical Research 3
Prescribed Elective Courses 6
Select one of the following:
  VTPP 223 Design of Experiments for Physiology Research 3
  or VTPP 224 In Vitro Experimentation in Physiology Research
  VTPP 234 Design of Models for Physiology Research 3
  or VTPP 235 Analysis and Validation of Models for Physiology Research

Total Semester Credit Hours 18

Department of Small Animal Clinical Sciences

http://vetmed.tamu.edu/vscs

International Certificate in Cultural Competency and Communications in Spanish

Students who complete this certificate will be functionally bilingual and able to perform linguistically in a culturally sensitive manner within the biomedical environment. A required study abroad will allow students to gain experiential knowledge, expanding their cultural sensitivities and functionality in a foreign environment. Because of limited resources, the program will have a cap on the number of students admitted. All courses in the program must be completed with a grade of C or better. The certificate will be awarded upon completion of a BS degree in Biomedical Sciences.

Program Requirements

To earn the certificate, students are required to complete:

SPAN 201 Intermediate Spanish I 1 3
SPAN 202 Intermediate Spanish II 1 3
SPAN 300/SPAN 400 level course of the student’s choice 2 3
3 credit hours of area studies from an approved course list 3 3
Minimum of 2 credit hours in a medical communications Area 4 2
BIMS 485 5 2
An international experience approved by the Biomedical Sciences Program 6

Total Semester Credit Hours 16

1 SPAN 221 and SPAN 222 are acceptable substitutions, when taken abroad, for SPAN 201 and SPAN 202.
2 Prerequisites apply.
3 The certificate was designed with the student’s required Texas A&M Core Curriculum (p. 19) in mind. Many of the courses on the approved list will count as a language, philosophy and culture, creative arts, or social and behavioral sciences. It is up to the student to compare the two lists and to work with their academic advisor to choose courses appropriate to their degree plan.
4 It is suggested that students enroll in this course after the completion of at least SPAN 201 or equivalent. For course options, see academic advisor.
5 This course is a specific section of 485 that requires shadowing in the biomedical environment while using the Spanish language.
6 This requirement may be satisfied by an approved study abroad program.

University Studies Programs

The College of Veterinary Medicine and Biomedical Sciences offers a Bachelor of Science in University Studies degree with a concentration in biomedical sciences. Contact the college for more information.

Majors

- Bachelor of Science in University Studies, Biomedical Sciences Concentration (p. 581)

University Studies - BS, Biomedical Sciences Concentration

The College of Veterinary Medicine and Biomedical Sciences offers a Bachelor of Science in University Studies degree with a concentration in biomedical sciences.

Program Requirements

BIMS 320/ GENE 320 Biomedical Genetics 3
Select from the following: 4
  BIMS 421/ GENE 421 Advanced Human Genetics
  VIBS 310 Biomedical Writing
  VIBS 311 Biomedical Explorations through Narrative
  VIBS 432 Public Health Practices
  VIBS 443 Biology of Mammalian Cells and Tissues
  VTPB 409 Introduction to Immunology
  VTPB 487/ BIOL 487 Biomedical Parasitology
  VTPB 405 Biomedical Microbiology 5

1 SPAN 221 222 are acceptable substitutions, when taken abroad, for SPAN 201 and SPAN 202.
2 Prerequisites apply.
3 The certificate was designed with the student’s required Texas A&M Core Curriculum (p. 19) in mind. Many of the courses on the approved list will count as a language, philosophy and culture, creative arts, or social and behavioral sciences. It is up to the student to compare the two lists and to work with their academic advisor to choose courses appropriate to their degree plan.
4 It is suggested that students enroll in this course after the completion of at least SPAN 201 or equivalent. For course options, see academic advisor.
5 This course is a specific section of 485 that requires shadowing in the biomedical environment while using the Spanish language.
6 This requirement may be satisfied by an approved study abroad program.
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<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
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<td>&amp; CHEM 111</td>
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<td>CHEM 102</td>
<td>Fundamentals of Chemistry II</td>
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<td>&amp; CHEM 112</td>
<td>and Fundamentals of Chemistry Laboratory II</td>
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<td>CHEM 227</td>
<td>Organic Chemistry I</td>
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<td>BIMS Directed Electives</td>
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Select hours from the following:
- ANSC 107 General Animal Science
- ANSC 108 General Animal Science
- ANSC 210 Companion Animal Science
- ANSC 303/ Principles of Animal Nutrition
- NUTR 303
- ANSC 318 Feeds and Feeding
- ANSC 320 Animal Nutrition and Feeding
- BICH 412 Biochemistry Laboratory I
- BICH 414 Biochemical Techniques I
- BIMS 110 One Health in Action
- BIMS 201 Introduction to Phenotypic Expression in the Context of Human Medicine
- BIMS 289 Special Topics in...
- BIMS 291 Research
- BIMS 392 Cooperative Education in Biomedical Science
- BIMS 405/ Mammalian Genetics
- GENE 405
- BIMS 421/ Advanced Human Genetics
- GENE 421
- BIMS 452/ Modifying Mammalian Genomes for Biomedical Research
- GENE 452
- BIMS 481 Seminar in Biomedical Science
- BIMS 484 Biomedical Science Field Experience
- BIMS 485 Directed Studies
- BIMS 489 Special Topics in...
- BIMS 491 Research
- ENTO 208 Veterinary Entomology
- ENTO 210 Global Public Health Entomology
- ENTO 423 Medical Entomology
- ENTO 431/ The Science of Forensic Entomology
- FIVS 431 and Applied Forensic Entomology & ENTO 432/FIVS 432
- FSTC 326/ Food Bacteriology
- DASC 326
- FSTC 327/ Food Bacteriology Lab
- DASC 327
- GENE 421/ Advanced Human Genetics
- BIMS 421
- GENE 431/ Molecular Genetics
- BICH 431
- GENE 432/ Laboratory in Molecular Genetics
- BICH 432
- GENE 450 Recombinant DNA and Biotechnology
- NUTR 222 Nutrition for Health and Health Care
- URPN 370 Health Systems Planning
- VIBS 204 Fundamentals of Food Toxicology and Safety
- VIBS 277/ Introduction to Neuroscience
- NRSC 277
- VIBS 310 Biomedical Writing
- VIBS 311 Biomedical Explorations through Narrative
- VIBS 343 Histology
- VIBS 401 Developmental Neurotoxicology
- VIBS 404 Food Toxicology and Safety
- VIBS 411 Tumor Cell Biology and Carcinogenesis
- VIBS 413 Introduction to Epidemiology
- VIBS 420 Computer Applications in Public Health Research
- VIBS 432 Public Health Practices
- VIBS 443 Biology of Mammalian Cells and Tissues
- VIBS 450/ Mammalian Functional Neuroanatomy
- NRSC 450
- VTPB 301/ Wildlife Diseases
- WFSC 327
- VTPB 303 Medical Communication in the International Community
- VTPB 334 Poultry Diseases
- VTPB 408 Clinical Microbiology
- VTPB 409 Introduction to Immunology
- VTPP 422 Pharmacy
- VTPP 410 Cell Mechanisms of Disease
- VTPP 412 Techniques of Clinical Pathology
- VTPP 415 Immunogenetics and Comparative Immunology
- VTPP 421 Bacterial Diseases of Humans and Animals
- VTPP 438 Biomedical Virology
- VTPP 452 Clinical Veterinary Mycology
- VTPP 454/ Ornamental Fish Health Management
- MARB 454
- VTPP 487/ Biomedical Parasitology
- BIOL 487
- VTPP 424/ Biomedical Neuroendocrinology and Endocrine Disorders
- VIBS 424 Disorders
- VTPP 401 History of Human and Veterinary Medicine in Europe
- VTPP 425 Pharmacology
- VTPP 427 Biomedical Physiology II
- VTPP 429 Introduction to Toxicology
- VTPP 438 Analysis of Genomic Signals
- WFSC 327/VTPB 301 Wildlife Diseases

**University and College Requirements**
- Communication (p. 20) 6
- Mathematics (p. 20) 3
- Mathematics Elective 3
  - Select one of the following:
    - MATH 131 Mathematical Concepts—Calculus
    - MATH 142 Business Mathematics II
    - MATH 151 Engineering Mathematics I
    - MATH 171 Analytic Geometry and Calculus
    - BIOL 111 Introductory Biology I 4
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<td>CHEM 237</td>
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<td>Creative Arts (p. 22)</td>
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<td>Social and behavioral sciences (p. 23)</td>
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<td>American history (p. 23)</td>
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<td>POLS 206</td>
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<td>POLS 207</td>
<td>State and Local Government</td>
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1. Up to 4 course hours may be selected from BIMS 484, BIMS 485; VIBS 285, VIBS 485, VIBS 489; VLCS 485; VSCS 485; VTPB 285, VTPB 485, VTPB 489; VTPP 285, VTPP 481, VTPP 485, VTPP 489.

2. Completion of four semesters of upper-level ROTC may be substituted for 3 hours of American history and 3 hours of political science.

3. Includes 30-36 hours used to satisfy the two minor requirements and 2 to 8 hours of general electives.

4. Select 2 to 8 hours of any 100-499 course not used elsewhere.
School of Military Science

Administrative Officers
Commandant - Brigadier General Joe E. Ramirez, Jr., USA, M.S.

General Statement
The School of Military Sciences is composed of three departments: Aerospace Studies, Military Science and Naval Science.

All courses offered by the School of Military Sciences are accredited by the University. However, the credit granted for degree plans varies by college and often by department. For precise information, consult the associate dean or department head.

The University’s commitment to providing highly skilled and disciplined leaders to the Armed Forces requires all students enrolled in ROTC programs at Texas A&M to be members of the Corps of Cadets.

Students not enrolled in an ROTC program may be permitted to take ROTC courses as electives with the advance approval of the professor of military science, the professor of aerospace studies, or the professor of naval science, as appropriate, and the concurrence of the head of the School of Military Sciences.

State law permits the substitution of 3 hours of history and 3 hours of political science for a student in the program of an approved senior ROTC unit. With the approval of the dean of the appropriate college, students successfully completing their required four semesters of upper-level ROTC curriculum will be deemed to have completed the equivalent of POLS 206 or POLS 207 plus HIST 105 or HIST 106 (or another appropriate course) for a total of 6 hours.

Students in the College of Liberal Arts may not substitute upper-level ROTC courses for this requirement. Students pursuing teacher certification are not allowed to substitute ROTC credits for this requirement.

Departments
Aerospace Studies (p. 585)
Military Science (p. 586)
Naval Science (p. 586)

Minors
• Military Studies Minor (p. 584)

Military Studies - Minor
The School of Military Sciences offers a minor in Military Studies. This minor is available to all Texas A&M students but is not required for ROTC or Corps of Cadets participation. Students should consult with an advisor in their major department to determine minor requirements. All students desiring to enroll in the Military Studies minor should contact the Assistant Commandant for Academics and International Programs in Room 211 of the Buzbee Leadership Learning Center, (979) 458-2829.

Program Requirements
The Military Studies minor requires 18 hours. Nine hours must be completed in approved upper-level Aerospace Studies, Military Science, or Naval Science courses with an additional 9 hours from approved university courses with a military-related focus. A minimum of 12 hours must be at the 300-400 level. A grade of C or higher is required if a course is to be counted towards the minor field. Minor programs are recognized on the transcripts after graduation, but not on the diploma. The student’s college and/or major department determines the number of minor programs a student may seek and shall be responsible for advising after the student receives signed approval from the Assistant Commandant for Administration.

Military Science Courses
Select three of the following: 9
NVSC 303 Evolution of Warfare
NVSC 401 Naval Ships Systems II: Weapons
NVSC 402 Leadership and Ethics
NVSC 410 Amphibious Warfare
AERS 303 Air Force Leadership Studies
AERS 304 Air Force Leadership Studies
AERS 403 National Security Affairs—Preparation for Active Duty
AERS 404 National Security Affairs—Preparation for Active Duty
MLSC 321 Adaptive Leadership and Tactical Operations I
MLSC 322 Adaptive Leadership and Tactical Operations II
MLSC 421 The Army Officer and the Profession of Arms I
MLSC 422 The Army Officer and the Profession of Arms II

Non-Military Science Courses
Select three from the following: 9
CLAS 371 In Search of Homer and the Trojan War
GEOG 320 The Middle East
GEOG 327 Geography of South Asia
GEOG GNSS in the Geosciences
GEOG 352/GEOL 352 GNSS in the Geosciences
GEOG 361 Remote Sensing in Geosciences
GEOG 390 Principles of Geographic Information Systems
GEOG 401 Political Geography
GEOG 420 Geography of Terrorism
GEOG 475 Advanced Topics in GIS (Geographic Information Systems)
GEOG 352/ GNS in the Geosciences
GEOG 352
HIST 230 American Military History, 1609 to Present
HIST 232 History of American Sea Power
HIST 234 European Military History, 1630-1900
HIST 337 War and European Society in the Twentieth Century
HIST 348 Modern Middle East
HIST 349/ ASIA 349 The Vietnam War/The American War
HIST 350/ ASIA 350 Asia During World War II
HIST 353 Modern South Asia
The Air Force ROTC (AFROTC) program at Texas A&M University is the largest AFROTC program in the United States and is designed to prepare selected students to be commissioned officers in the United States Air Force.

The institutional phase of AFROTC, called aerospace studies, is divided into two parts. The first two years constitute the General Military Course and the second two years constitute the Professional Officer Course. Details on courses offered are set forth in the alphabetical departmental listing. Concurrent enrollment in more than one aerospace studies course requires the approval of the department head, also known as the Professor of Aerospace Studies.

The General Military Course consists of the 100- and 200-level courses. These courses focus on the structure and missions of Air Force organizations; officership and professionalism; and, include an introduction to communicative skills. The General Military Course prepares the cadet, as a candidate, for the Professional Officer Course (POC). Cadets in the General Military Course attend one hour of class plus two hours of leadership lab per week.

Students apply for enrollment in the Professional Officer Course during their sophomore year. Enrollment in the Professional Officer Course at the beginning of the junior year is limited to students of high moral character who are academically qualified, physically fit, possess the necessary interest and aptitude, and have demonstrated leadership potential.

Before entry into the Professional Officer Course, cadets must attend AFROTC Field Training during the summer months typically between the sophomore and junior academic years. The major areas of study in the Field Training program include junior officer training, aircraft and aircrew orientation, career orientation, survival training, base functions, Air Force environment, physical fitness training, and a culmination field training exercise. Those who complete Field Training are enlisted in the Air Force Reserve and enter the POC.

The purpose of the Professional Officer Course is to develop skills and attitudes vital to a career as a professional Air Force officer. A degree is a prerequisite for an Air Force commission. Cadets attend class three hours a week and leadership lab two hours per week during each semester of the Professional Officer Course.

If a student is selected for and enrolled in the Professional Officer Course, he or she must sign a contract with the government in which he or she agrees to enlist in the Air Force Reserve, complete the course and, upon graduation, accept a commission as an officer in the United States Air Force. He or she also must agree to serve on active duty for not less than four years after being commissioned. Persons selected for flight training must serve ten years of active duty following completion of pilot training. During their two years in the Professional Officer Course, cadets are eligible to receive monthly subsistence pay, plus added monetary incentives.

Leadership training is continuous during the student’s life as an AFROTC cadet. One way this is accomplished is through Leadership Laboratory. Instruction is conducted within the framework of an organized cadet corps with a progression of experiences designed to develop each student’s leadership potential. Leadership Laboratory involves a study of Air Force customs and courtesies, drill and ceremonies, Air Force career opportunities, and expectations of an Air Force junior officer. Students develop their leadership in a practical, supervised laboratory, which typically includes field trips to Air Force installations.

Students enrolled in the four-year program may apply and compete for two- or three-year AFROTC College Scholarships. The AFROTC In-College Scholarship Program is a highly competitive program aimed primarily at college freshmen and sophomores in any major. If selected for an AFROTC scholarship, the student will receive tuition payment, textbook allowance and monthly subsistence allowance.

### Aerospace Studies

The Air Force ROTC (AFROTC) program at Texas A&M University is the largest AFROTC program in the United States and is designed to prepare selected students to be commissioned officers in the United States Air Force.

The institutional phase of AFROTC, called aerospace studies, is divided into two parts. The first two years constitute the General Military Course and the second two years constitute the Professional Officer Course. Details on courses offered are set forth in the alphabetical departmental listing. Concurrent enrollment in more than one aerospace studies course requires the approval of the department head, also known as the Professor of Aerospace Studies.

The General Military Course consists of the 100- and 200-level courses. These courses focus on the structure and missions of Air Force organizations; officership and professionalism; and, include an introduction to communicative skills. The General Military Course prepares the cadet, as a candidate, for the Professional Officer Course (POC). Cadets in the General Military Course attend one hour of class plus two hours of leadership lab per week.

Students apply for enrollment in the Professional Officer Course during their sophomore year. Enrollment in the Professional Officer Course at the beginning of the junior year is limited to students of high moral character who are academically qualified, physically fit, possess the necessary interest and aptitude, and have demonstrated leadership potential.

Before entry into the Professional Officer Course, cadets must attend AFROTC Field Training during the summer months typically between the sophomore and junior academic years. The major areas of study in the Field Training program include junior officer training, aircraft and aircrew orientation, career orientation, survival training, base functions, Air Force environment, physical fitness training, and a culmination field training exercise. Those who complete Field Training are enlisted in the Air Force Reserve and enter the POC.

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Leadership training is continuous during the student’s life as an AFROTC cadet. One way this is accomplished is through Leadership Laboratory. Instruction is conducted within the framework of an organized cadet corps with a progression of experiences designed to develop each student’s leadership potential. Leadership Laboratory involves a study of Air Force customs and courtesies, drill and ceremonies, Air Force career opportunities, and expectations of an Air Force junior officer. Students develop their leadership in a practical, supervised laboratory, which typically includes field trips to Air Force installations.

Students enrolled in the four-year program may apply and compete for two- or three-year AFROTC College Scholarships. The AFROTC In-College Scholarship Program is a highly competitive program aimed primarily at college freshmen and sophomores in any major. If selected for an AFROTC scholarship, the student will receive tuition payment, textbook allowance and monthly subsistence allowance.
Upon completion of the Professional Officer Course and graduation from the University, students are commissioned as Second Lieutenants in the United States Air Force. All instructors are active duty officers assigned to the University by the United States Air Force. Information about the Air Force ROTC program may be obtained by contacting the Detachment, or visiting the Air Force ROTC (http://afrotc.tamu.edu) website.

Military Science

The Army ROTC program at Texas A&M is the oldest on campus. Aggie ROTC graduates are renowned throughout the Army and business world for their leadership abilities, initiative, and competence.

AROTC graduates are proud to contribute to the heritage of the "Fightin' Texas Aggies." Army ROTC members are leaders in a wide variety of university activities including Student Government, campus athletics, the Fightin' Texas Aggie Band Ross Volunteer Company, Rudder's Rangers and Parsons Mounted Calvary. The Army ROTC Ranger Challenge Team is a perennial contender at both the Regional and National levels having finished in the top five at the Sandhurst competition hosted by the US Military Academy in consecutive years. The Ranger Challenge Team works closely with the Corps-sponsored Aggie Pathfinder orienteering team to develop expert land navigation skills and the stamina to compete in physically challenging terrain.

The Army has the career field to match a student's education and interests, with no restrictions on the major field of study or discipline. Army ROTC classes are unique in the college curriculum in offering both classroom instruction and hands-on leadership development opportunities. The Army ROTC student may enter such diverse career fields as aviation, engineering, law enforcement, medical services, armor, infantry, artillery, communications, finance, personnel administration, transportation, or military intelligence. Engineering students are eligible to participate in the University's chapter of the Society of American Military Engineers. Opportunities in airborne, ranger and special operations are also available. Highly qualified applicants may compete to take part in the delayed entry program while pursuing medical or law degrees and selected cadets may attend specialty military training including airborne, air assault, Northern warfare, and Mountain Warfare Schools.

Army ROTC is divided into two parts: The Basic and Advanced Courses. The Basic Course is taken in the freshman and sophomore years. Coursework covers the areas of military courtesy, discipline, and customs as well as map reading, marksmanship and land navigation. Students begin leadership development opportunities as members of the Warrior Training Battalion participating in weekly tactical leadership labs and field training exercises. Uniforms and the necessary textbooks are furnished and there is no military commitment for participation in the Basic Course. Three and Four year ROTC scholarship winners attend Cadet Initial entry training in the summer after their Freshman or Sophomore years. The Advanced Course is taken in the final two years of college and includes the Cadet Leader Course (CLC) during the summer after the junior or senior year. Instruction includes advanced leadership development, organization ethics critical thinking and problem solving, administration, and military law. Summer training at Fort Knox, Kentucky enables cadets to put into practice, in a field environment, the principles and theories acquired in the classroom. All cadets in the Advanced ROTC program and who have entered into a commissioning contract receive a tiered subsistence allowance up to $500 per month and are paid approximately $800 for attending CLC. Army ROTC cadets are encouraged to take courses in strategic languages. Through the Army’s Culture and Language Incentives Program, students can earn up to $300 per credit hour for completing classes in qualifying languages. In addition, AROTC sponsors the Cultural Understanding and Language Proficiency Program that affords students the opportunity to participate in month long immersion programs in over 40 countries.

Army ROTC cadets receiving commissions may request to serve on active duty with the U.S. Army following graduation or to pursue a civilian career upon completion of the officer's basic schooling while remaining affiliated with the Army Reserve or National Guard.

Military Science

The Army ROTC Scholarship program awards four-year and three-year advance designee scholarships on a competitive basis to students entering ROTC as college freshmen. Two-year and three-year scholarships also are available for college students already enrolled in ROTC. These scholarships pay the cost of tuition, required fees and a flat rate textbook allowance for the duration of the award and provide a tiered subsistence allowance of up to $500 per month. In all, a four-year scholarship can be worth over $58,000 at Texas A&M. Additional scholarship opportunities are available specifically for students participating in Science, Technology, Engineering, and Math majors that pay the same benefits as four and three-year ROTC scholarships.

Qualified students who join the Army National Guard or Army Reserve, may participate in the Simultaneous Membership Program (SMP) in which they earn approximately $250 per month. The total dollar amount for SMP cadets can reach $750 per month during their junior and senior years in ROTC. Tuition assistance, which pays between 75-100% of tuition costs, is available through the US Army Reserves and Texas National Guard.

Qualified veterans may enroll directly into the ROTC Advanced Course. Veterans in the Advanced Program receive a tiered subsistence allowance of up to $500 per month in addition to their veterans' benefits. The U.S. Army Health Profession Scholarship Program offers a unique opportunity for financial support to cadets who desire to continue their education beyond their undergraduate work by enrolling in a program leading to a professional degree in medicine, dentistry or veterinary medicine.

Texas A&M’s staff, having served multiple combat and operational deployments overseas, are dedicated to developing academically superior and physically fit commissioned officers recognized as outstanding leaders of character for the U.S. Army Officer Corps. For more information on Army ROTC programs, contact the Military Science Department at (979) 845-2814.

Naval Science

Mission

The Naval ROTC Unit at Texas A&M University provides qualified young men and women the opportunity to learn the mission of the Naval Services and pursue a commission as an officer in the United States Navy or United States Marine Corps. The Naval ROTC Unit operates as the Department of Naval Science at Texas A&M and is one of the largest Naval ROTC Units in the United States. Graduates from our program can be found serving around the world. Officers commissioned as Ensigns in the United States Navy have the option, based on physical and aptitude qualification, to serve in the Aviation (Pilot or Naval Flight Officer), Surface Warfare (Conventional or Nuclear), Nuclear Submarine, or Special Warfare (SEAL or Explosive Ordnance Disposal) communities. Officers commissioned as Second Lieutenants in the United States Marine Corps can serve in one of more than 36 military operational specialties in three categories including Aviation (Pilot or Naval Flight Officer), Combat Arms (Infantry, Artillery,
Naval ROTC students may participate fully in all aspects of university life. This includes serving in positions with Student Government or the Memorial Student Center, belonging to campus clubs and service organizations, or participating in religious, social, professional or personal interest organizations. The NROTC Unit also sponsors and advises special units within the Corps of Cadets; SEAL Platoon and RECON Company.

Scholarships
The Naval ROTC program provides numerous scholarship opportunities for qualified individuals who are seeking a commission upon graduation as an officer in either the United States Navy or United States Marine Corps. The four-year Naval ROTC scholarship program is a nationally competitive program. High school students seeking a four-year Navy or Marine Corps Option Naval ROTC scholarship may apply as early as the spring of their junior year in high school, and should apply no later than December of their senior year in high school. The Naval ROTC scholarship pays for all tuition, most university fees, some uniform fees, and provides the student with a monthly stipend and a semester book allowance. Three- and two-year scholarships with the same benefits listed above are available for qualifying students who apply while enrolled as NROTC students at Texas A&M.

College Program
Students without NROTC scholarships initially participate in Naval ROTC as Naval Science Students. Basic College Program students are guided by the same goals as the NROTC Scholarship students; to include meeting the physical requirements of the Corps of Cadets, maintaining a required minimum GPR, and possessing the aptitude and motivation for service above self. The Basic College Program exists to provide students the opportunity to learn about the United States Navy and United States Marine Corps and provide an alternate means for a commission for those not on scholarship. Basic College Program students can apply for a two-year or three-year Navy or Marine Corps Option Naval ROTC scholarship. Students who do not qualify for a scholarship but still desire a commission can apply for acceptance into the College Program (Advanced Standing). The College Program (Advanced Standing) begins during the junior year and pays a monthly stipend, but does not pay for tuition and fees. All NROTC students are provided Naval Science textbooks, which are returned at the end of each semester, at no cost.

Leadership
All Scholarship and College Program (Basic and Advanced Standing) NROTC students are also members of the Texas A&M Midshipman Battalion, an organization providing distinct training and leadership opportunities for students pursuing Navy and Marine Corps commissions. This training is accomplished through the NROTC’s Leadership Laboratory. Associated with each Naval Science class and conducted every Tuesday afternoon, Leadership Laboratory is a combination of classroom study and practical hands-on application that exposes the students to many facets of the Navy and Marine Corps and provides them the opportunity to develop their leadership skills.

Academic Requirements
Academic requirements vary by program, but all freshmen and sophomore Naval ROTC students must take a Naval Science (NVSC) class each Fall and Spring semester. These courses provide a basic understanding of the Navy and Marine Corps organization and mission; address the concepts of leadership, ethics, and management; and provide a basic understanding of the history of American sea power and the evolution of warfare throughout the ages. All Scholarship and College Program (Advanced Standing) students continue to take Naval Science courses during their junior and senior year. These courses cover additional topics such as navigation, weapons systems, amphibious warfare and leadership and ethics for the junior officer.

Summer Cruise
Scholarship students receive four to six weeks of additional training every summer with operational Navy and Marine Corps units around the world. Between the freshman and sophomore years, students receive orientation training with naval aviation, surface combatant, submarine and Marine Corps units. Between the sophomore and junior years, Navy Option students experience the life of enlisted sailors aboard ships and submarines and Marine Option students experience the life of enlisted marines with Marine units in the field. For the final training session between the junior and senior years, all Scholarship and College Program (Advanced Standing) students receive service-specific training in final preparation for commissioning. Navy Option students are assigned to aviation units, surface combatants or submarines depending upon their qualifications and desires and receive hands-on training working closely with qualified junior officers. Marine Option students attend Officer Candidate School at Quantico, VA where they are screened, trained and evaluated in an intense, competitive environment alongside other Marine Option students from around the country. Students participating in summer cruises are provided government travel, medical and dental care, commissary and exchange privileges, and are paid for the duration of the training.

Commissioning
Upon graduation, qualified Naval ROTC Navy and Marine Option Scholarship students receive commissions as Ensigns in the United States Navy or as Second Lieutenants in the United States Marine Corps and serve a minimum of four years of active duty. Qualified Naval ROTC College Program (Advanced Standing) Navy Option students receive commissions as Ensigns in the United States Navy and serve a minimum of three years of active duty. Qualified Naval ROTC College Program (Advanced Standing) Marine Option students receive commissions as Second Lieutenants in the United States Marine Corps and serve a minimum of three and a half years of active duty. Those Navy Option graduates who are academically qualified and accepted to graduate school in certain disciplines may apply for active duty deferments to complete their post-graduate education.

NROTC Staff
The staff of the Naval Science Department is dedicated to producing officers of the highest quality for the United States Navy and United States Marine Corps. All instructors are active duty Navy or Marine Corps officers and senior enlisted personnel assigned to the University by the United States Navy or United States Marine Corps. In addition, they work with the Corps of Cadets and act as military advisors to the Companies/Outfits within the Naval regiments. This group of highly trained professionals places specific emphasis on the academic and professional development of every student assigned. Additional information about the Naval ROTC program at Texas A&M University can be obtained by calling the Department at (979) 845-1775, or by visiting the Texas A&M Naval ROTC (http://nrotc.tamu.edu) website.
Texas A&M University at Galveston

Administrative Officers

Robert Smith III - Chief Executive Officer; Superintendent, Texas A&M Maritime Academy; Vice President, Texas A&M University

Patrick Louchouarn - Vice President for Academic Affairs and Chief Academic Officer; Associate Provost, Texas A&M University

Donna C. Lang - Vice President for Academic Operations

Susan Hernandez Lee - Vice President for Finance

Grant W. Shallenberger - Associate Vice President for Administration and Auxiliary Services

Tammy L. Holliday - Associate Vice President for Research Operations

Antonietta S. Quigg - Associate Vice President for Research and Graduate Studies

Todd Sutherland - Assistant Vice President for Student Affairs

General Statement

Texas A&M University at Galveston, a branch campus of Texas A&M University, offers ocean-oriented, undergraduate and graduate courses with excellence in business, oceanographic/physical and biological sciences, engineering and transportation. Degrees are awarded from Texas A&M University. Ocean voyages, sailing in Galveston Bay, beachfront experiments and independent study complement the rigorous classroom experience at Texas A&M University at Galveston. In addition to its academic programs, the campus houses the Texas A&M Maritime Academy, which offers training programs leading to officer licensing in the U.S. Merchant Marine.

Texas A&M University at Galveston is located near the mouth of Galveston Bay with close access to the Gulf of Mexico. The University has facilities at three separate campus locations. Most instructional programs are taught at the 130-acre Mitchell Campus on Pelican Island (with housing for 1,400+ students). The training ship serves as a floating classroom, laboratory and dormitory for the annual summer training cruise of the U.S. Maritime Service cadets. During the regular school year, a ship is berthed at Pelican Island and provides valuable dockside laboratory facilities for instruction in the practical aspects of the maritime curricula.

Courses of Study

Texas A&M University at Galveston provides undergraduate and graduate instruction in marine and maritime-related degree programs in Marine Biology, Marine Engineering Technology, Marine Fisheries, Marine Transportation, Maritime Administration (policy/business), Maritime Studies, Offshore and Coastal Systems Engineering (ocean/civil), Ocean and Coastal Resources, Marine Sciences (oceanography and geology), and University Studies. All students complete the University Core Curriculum requirements set by Texas A&M University to ensure a broad-based education. Graduate curricula are offered in Marine Resource Management (master’s level), Marine Biology (master’s and doctorate levels) and Maritime Administration and Logistics (master’s level). The Texas A&M Maritime Academy is headquartered on the Galveston campus.

Students interested in specific academic programs and course offerings on the Galveston campus should refer to the online catalog at www.tamug.edu.

Texas A&M University at Galveston is fully accredited by the “Southern Association of Colleges and Schools Commission on Colleges”. Maritime Systems Engineering and Marine Engineering Technology are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Admission

To obtain an enrollment packet or schedule a campus visit, call toll free at 1-87-SEAAGGIE, write Student Relations Office, Texas A&M University at Galveston, P. O. Box 1675, Galveston, TX 77553-1675, or visit www.tamug.edu. The SAT or the ACT admission examinations are acceptable. Students should have the scores forwarded to Texas A&M University at Galveston (Code 6835 for SAT and Code 6592 for ACT).

Acceptance by the Office of Admissions does not constitute admission to the U.S. Maritime Service License Option Program. When admission requirements have been satisfied, the Office of Enrollment Services will send the applicant a letter of acceptance.

U.S. Maritime Service Corps of Cadets

Texas A&M University at Galveston houses the Texas A&M Maritime Academy, which is one of six state maritime academies in the U.S. preparing graduates for licensing as officers in the American Merchant Marine. This program provides an opportunity for students to learn how to operate and maintain an ocean-going vessel. In addition to classroom and field training during the regular school year, students will sail aboard a training vessel during three summer cruises to gain practical experience in seamanship, navigation and operations. At the conclusion of the program, cadets are tested to become licensed as officers in the U.S. Merchant Marine and may seek employment in the exciting field of marine transportation as a licensed Third Mate or Third Assistant Engineer.

The NROTC Program offers men and women an opportunity to qualify for a commission in the Navy while attending Texas A&M University at Galveston. All NROTC students are required to participate in the Texas A&M Maritime Academy Corps of Cadets. Any student may join the NROTC Program either as a National Scholarship winner or as a non-subsidized college program student. Applications for National Scholarships can be obtained through a Navy recruiting office before the submission deadline of January 30 of the year for which the student is applying.

Facilities

Classrooms, laboratories and meeting spaces are housed within 18 major buildings on the Mitchell Campus on Pelican Island. The Ocean and Coastal Studies building is the largest and best-equipped marine research facility on the Gulf of Mexico. There are seven residence halls on campus, the James McCloy Arena and the Mary Moody Northen Student Center with cafeteria services. The Jack K. Williams Library contains over 43,000 books, 35,000 bound volumes of journals and a collection of charts and maps. The training ship provides additional classroom, meeting and training space during the school year. Texas A&M University at Galveston has telecommunications systems established to communicate statewide within The Texas A&M University System universities and agencies.
The Galveston campus has direct access to the Texas A&M University computer network in College Station via remote job entry connect lines.

Housing applications are available from Texas A&M University at Galveston and should be returned with the required deposit to the Office of Student Services, Texas A&M University at Galveston, P. O. Box 1675, Galveston, TX 77553-1675.
Texas A&M University at Qatar

Administrative Officers
Dean and CEO - Mark H. Weichold
Executive Associate Dean - Eyad A. Masad
Associate Dean for Research and Graduate Studies - Kenneth R. Hall
Assistant Dean for Academic Affairs - TBA
Assistant Dean for Finance and Administrative Services - Rosalie Nickles
Assistant Dean for Research and Graduate Studies - Hassan S. Bazzi

General Statement
Texas A&M’s branch campus in Qatar, part of the 2,500-acre multi-institutional campus known as Education City formally opened on September 7, 2003, offering undergraduate degree programs in chemical, electrical, mechanical, and petroleum engineering. Texas A&M’s engineering program is widely considered among the best in America, and the curricula offered at the Qatar campus are materially the same as those offered at the main campus located in College Station, Texas. Texas A&M University at Qatar is fully funded by the Qatar Foundation for Education, Science, and Community Development and provides a unique opportunity for the University to expand its international presence and provide educational and research opportunities for faculty and students.

Programs of Study at Texas A&M University at Qatar
Texas A&M University’s Dwight Look College of Engineering strives to provide its students with a high-quality education that will prepare them for a wide range of careers at the forefront of the engineering field. The curriculum is designed to accomplish this by closely integrating cutting-edge basic and applied research with innovative classroom instruction. Texas A&M University’s engineering programs are routinely ranked among the best in the U.S., and graduates are highly sought-after to provide leadership and innovative solutions to global challenges.

Our faculty members maintain active research programs in a wide range of areas. In addition, our undergraduate students participate in numerous co-op and internship programs, which give them the opportunity to apply their knowledge to real-world challenges in a variety of settings.

At Texas A&M University at Qatar, engineering students take courses in the fundamental disciplines—mathematics, sciences, and liberal arts—that will prepare them for the rigorous technical training that follows. This training is dedicated to specialized studies in one of the four engineering fields offered at Texas A&M University at Qatar. After completing intensive, demanding course work and practical experience, students are ready to step into their professional fields and make immediate, meaningful contributions.

Admission
The online application for undergraduate admission may be found at www.qatar.tamu.edu/apply. Additional information may be obtained by calling +974 (4423-0043), or by visiting the Office of Admissions at the Engineering Building located in Education City, Doha, Qatar. To be considered a candidate for admission to Texas A&M University at Qatar, the prospective student must formally apply by submitting all of the required documents and test scores and meeting all of the admission requirements. Required documents may include the following:
1. Completed application
2. Passport copy (resident permit if required)
3. Official high school/secondary school transcript
4. Official college/university and/or Academic Bridge Program transcripts (if applicable)
5. Official test scores
6. Essay
7. Resume/Curriculum Vitae
8. Reference forms
9. Application fee

Facilities
The Texas A&M at Qatar Engineering Building is one of the most advanced facilities for engineering education in the world. Designed by the Mexican architect Ricardo Legoretta, the 55,000 square meter (592,000 square feet) facility combines modernist elements with traditional Islamic architectural motifs. The building is fully wireless and features high-tech classrooms, teaching laboratories and computer laboratories. The research annex provides additional research laboratories that give future Aggie engineers firsthand experience.

Texas A&M at Qatar’s home in Education City also includes a library with a core professional collection of 10,000 engineering titles and 40 print journals in the liberal arts, humanities, and basic sciences. Students also have access to books and journals from the libraries on the main campus, from collections that exceed 4 million volumes and 95,000 serial titles. Extensive online resources are available to students in the library and remotely, including more than 100,000 electronic journals and newspapers, over 4,000 databases, and over 1.5 million electronic books.

In order to take full advantage of the electronic resources available to university students, all incoming students are provided a wireless-equipped laptop computer fully loaded with the software necessary to complete the engineering curriculum.
Course Descriptions

All undergraduate courses offered in the University are described on each subject page. Some of the new courses and changes in courses are included in this catalog pending their approval by the Texas Higher Education Coordinating Board. The course numbering scheme is as follows: 100–199, primarily open to freshmen; 200–299, primarily open to sophomores; 300–399, primarily open to juniors; and 400–499, primarily open to seniors.

Figures in parenthesis before the course description indicate the Texas Common Course Number(s). The unit of credit is the semester hour, which involves one hour of theory or from two to four hours of practice per week for one semester of 15 weeks. Figures following the credit hours indicate the clock hours per week devoted to theory and practice, respectively. Theory includes recitations and lectures; practice includes work done in the laboratory, shop, drawing room, field or other. When courses are cross-listed, credit cannot be received for both courses. Any course may be withdrawn from the session offerings in case the number of registrations is too small to justify offering the course.

Field trips may be required for which departmental fees may be assessed to cover costs.

AALO - Arabic & Asian Language

Courses

AALO 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Individual supervision of readings or assigned projects in an Asian Language, selected for each student individually; written or oral reports. 
Prerequisite: Approval of Arabic and Asian Language Office Director.

AALO 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours, 0 to 4 Lab Hours.
Selected topics in an identified area of an Asian language. May be repeated for credit.
Prerequisite: Approval of Arabic and Asian Language Office Director.

AALO 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Individual supervision of readings or assigned projects selected for each student individually; written or oral reports.
Prerequisite: Approval of Arabic and Asian Language Office Director.

AALO 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours, 0 to 4 Lab Hours.
Selected topics in an identified area of an Asian language. May be repeated for credit.
Prerequisite: Approval of Arabic and Asian Language Office Director.

ACCT - Accounting

Courses

ACCT 209 Survey of Accounting Principles
Credits 3. 3 Lecture Hours.
Accounting survey for non-business majors; non-technical accounting procedures, preparation and interpretation of financial statements and internal control. May not be used to satisfy degree requirements for majors in business. Business majors who choose to take this course must do so on a satisfactory/unsatisfactory basis.

ACCT 210 Survey of Managerial and Cost Accounting Principles
Credits 3. 3 Lecture Hours.
A survey of managerial and cost accounting for non-business majors; accounting responsibility of the manager, job and process cost systems, budgeting, cost-volume-profit analysis for decision-making. May not be used to satisfy degree requirements for majors in business. Business majors who choose to take this course must do so on a satisfactory/unsatisfactory basis.
Prerequisite: ACCT 209.

ACCT 229 Introductory Accounting
Credits 3. 3 Lecture Hours.
(ACCT 2301, 2401) Introductory Accounting. Analysis, recording and reporting of business transactions; partnership and corporation accounting; analysis and use of financial statements.
Prerequisite: Sophomore classification.

ACCT 230 Introductory Accounting
Credits 3. 3 Lecture Hours.
(ACCT 2302, 2402) Introductory Accounting. Continuation of ACCT 229. Use of budgets; introduction to cost accounting; cost control techniques and methods of measuring performance.
Prerequisites: ACCT 229 and sophomore classification.

ACCT 310 PERSONAL BUDGETING
Credits 2. 2 Lecture Hours.

ACCT 315 Intermediate Accounting for Non-Accounting Majors I
Credits 3. 3 Lecture Hours.
Revenue recognition, principles of asset valuation, and disclosure requirements for corporations; interpretation of financial statements, rather than their preparation. May not be used as a directed or free elective for accounting majors and does not count towards the accounting requirement for the CPA exam.
Prerequisite: ACCT 230 and admission to upper division in Mays Business School.

ACCT 316 Intermediate Accounting for Non-Accounting Majors II
Credits 3. 3 Lecture Hours.
Includes the measurement and disclosure requirements for liabilities and stockholders' equity, SEC registration statements, and cash flow reporting; focus on the analysis and interpretation of financial statements rather than their preparation. Does not qualify as a directed or free elective for accounting majors and does not count towards the accounting requirement for the CPA exam.
Prerequisite: ACCT 315 or ACCT 327.

ACCT 320 Accounting Communications
Credits 3. 3 Lecture Hours.
Development of oral and written communication skills
prerequisite to successful careers in public and corporate accounting. Prerequisite: Admission to Professional Program.

ACCT 321 Survey of Managerial and Cost Accounting Principles
Credits 3. 3 Lecture Hours.
A survey of managerial and cost accounting for non-business majors; accounting responsibility of the manager, job and process cost systems, budgeting, cost-volume-profit analysis for decision-making. May not be used to satisfy degree requirements for majors in business. Business majors who choose to take this course must do so on a satisfactory/unsatisfactory basis.
Prerequisite: ACCT 209.

ACCT 230 and admission to upper division in Mays Business School.

ACCT 315 Intermediate Accounting for Non-Accounting Majors II
Credits 3. 3 Lecture Hours.
Revenue recognition, principles of asset valuation, and disclosure requirements for corporations; interpretation of financial statements, rather than their preparation. May not be used as a directed or free elective for accounting majors and does not count towards the accounting requirement for the CPA exam.
Prerequisite: ACCT 230 and admission to upper division in Mays Business School.

ACCT 316 Intermediate Accounting for Non-Accounting Majors II
Credits 3. 3 Lecture Hours.
Includes the measurement and disclosure requirements for liabilities and stockholders' equity, SEC registration statements, and cash flow reporting; focus on the analysis and interpretation of financial statements rather than their preparation. Does not qualify as a directed or free elective for accounting majors and does not count towards the accounting requirement for the CPA exam.
Prerequisite: ACCT 315 or ACCT 327.

ACCT 320 Accounting Communications
Credits 3. 3 Lecture Hours.
Development of oral and written communication skills
prerequisite to successful careers in public and corporate accounting. Prerequisite: Admission to Professional Program.

ACCT 321 Survey of Managerial and Cost Accounting Principles
Credits 3. 3 Lecture Hours.
A survey of managerial and cost accounting for non-business majors; accounting responsibility of the manager, job and process cost systems, budgeting, cost-volume-profit analysis for decision-making. May not be used to satisfy degree requirements for majors in business. Business majors who choose to take this course must do so on a satisfactory/unsatisfactory basis.
Prerequisite: ACCT 209.

ACCT 230 and admission to upper division in Mays Business School.

ACCT 315 Intermediate Accounting for Non-Accounting Majors II
Credits 3. 3 Lecture Hours.
Revenue recognition, principles of asset valuation, and disclosure requirements for corporations; interpretation of financial statements, rather than their preparation. May not be used as a directed or free elective for accounting majors and does not count towards the accounting requirement for the CPA exam.
Prerequisite: ACCT 230 and admission to upper division in Mays Business School.

ACCT 316 Intermediate Accounting for Non-Accounting Majors II
Credits 3. 3 Lecture Hours.
Includes the measurement and disclosure requirements for liabilities and stockholders' equity, SEC registration statements, and cash flow reporting; focus on the analysis and interpretation of financial statements rather than their preparation. Does not qualify as a directed or free elective for accounting majors and does not count towards the accounting requirement for the CPA exam.
Prerequisite: ACCT 315 or ACCT 327.

ACCT 320 Accounting Communications
Credits 3. 3 Lecture Hours.
Development of oral and written communication skills
prerequisite to successful careers in public and corporate accounting. Prerequisite: Admission to Professional Program.

ACCT 321 Professional Development Seminar
Credits 2. 2 Lecture Hours.
Exposure to professional issues of professional accounting practice using a workshop format.
Prerequisite: Admission to Professional Program.
ACCT 322 Professional Development Seminar – BBA
Credit 1. 1 Lecture Hour.
Exposure to professional issues in the practice of accounting, including potential careers and employers.
Prerequisite: ACCT 327 with a grade of C or better.

ACCT 327 Financial Reporting I
Credits 3. 3 Lecture Hours.
Study of theoretical basis for financial accounting concepts and principles related to financial reporting; emphasis on income measurement and accounting for assets. BBA accounting majors must earn a minimum grade of C for graduation.
Prerequisite: ACCT 230 and admission to upper division in Mays Business School.

ACCT 328 Financial Reporting II
Credits 3. 3 Lecture Hours.
Continued study of accounting concepts and principles related to reporting long-debt and owners’ equity; including reporting issues of leases, retirement benefits, income taxes and international accounting standards.
Prerequisite: ACCT 327 with a grade of C or better.

ACCT 329 Cost Management and Analysis
Credits 3. 3 Lecture Hours.
Theory, concepts and methods relating to use of information and design of systems to aid managers in planning, controlling, decision making, evaluating performance and reporting financial results.
Prerequisite: ACCT 315 or ACCT 327 with a grade of C or better.

ACCT 403 Energy Accounting
Credits 3. 3 Lecture Hours.
Overview of the oil and gas industry and specialized financial accounting procedures associated with the industry; emphasis on accounting for exploration, development, production, depletion and amortization, joint operations, asset impairment and retirement obligation; includes reserve accounting/disclosure related to the above topics.
Prerequisite: ACCT 327 with C or better.

ACCT 405 Income Tax
Credits 3. 3 Lecture Hours.
Introduction to federal income tax legislation pertaining primarily to corporations and individuals.
Prerequisite: ACCT 327 with a grade of C or better.

ACCT 407 Auditing
Credits 3. 3 Lecture Hours.
Introduction to auditing theory and procedures pertaining to financial statements, in the context of both external auditing, by certified public accountants, and internal auditing; preparation of working papers.
Prerequisite: ACCT 327 with a grade of C or better.

ACCT 408 Internal Auditing
Credits 3. 3 Lecture Hours.
Reading and evaluation of current theory and procedures used by internal auditors; selected case studies; statistical methods of forming auditing judgment.
Prerequisite: ACCT 327 with a grade of C or better.

ACCT 410 Fraud Examination
Credits 3. 3 Lecture Hours.
Principles and methodologies of detecting and deterring fraud using accounting, auditing, and investigative skills; includes skimming, larceny, misappropriations, fraudulent statements, interviewing witnesses and support for litigation.
Prerequisites: ACCT 327 with a grade of C or better; junior or senior classification.

ACCT 421 Critical Communication Skills for Accountants
Credits 2. 2 Lecture Hours.
Development of oral and written communication skills prerequisite to successful careers in public and corporate accounting. Prerequisite: ACCT 327 with a grade of C or better.

ACCT 425 Corporate Tax Planning
Credits 3. 3 Lecture Hours.
Integration of tax regulations into overall corporate finance planning and decision making cycle.
Prerequisite: ACCT 405.

ACCT 426 Taxation of Low-Income Filers
Credits 3. 3 Lecture Hours.
Overview of the Federal income tax and its impact on low-income filers; includes socio-economic forces impacting low-income families and individuals; topics explored through community service and academic learning.
Prerequisites: Admission to upper division in Mays Business School and approval of instructor.

ACCT 427 Accounting and Financial Information Systems
Credits 3. 3 Lecture Hours.
Overall data flow systems emphasizing financial data and computerized systems, for accounting majors; flow and logic concepts, developing meaningful control concepts and data reporting techniques.
Prerequisite: ACCT 327 with a grade of C or better.

ACCT 445/IBUS 445 International Accounting
Credits 3. 3 Lecture Hours.
Introduction and examination of accounting issues unique to multinational enterprises and international business activity.
Prerequisites: ACCT 315 or ACCT 327; FINC 341.

ACCT 447/FINC 447 Financial Statement Analysis
Credits 3. 3 Lecture Hours.
Development of an analytical approach to financial statements, integrating relevant finance and accounting concepts and principles; current topics in financial analysis.
Prerequisites: ACCT 315 or ACCT 327; FINC 341 with a grade of C or better.
Cross Listing: FINC 447/ACCT 447.

ACCT 450 Accounting Ethics
Credits 3. 3 Lecture Hours.
Integration of ethical reasoning, objectivity, independence and other core values into the development of a professional accountant; critical analysis of the ethical lapses which have occurred in business and the accounting profession; exploring ways to integrate ethical behavior into professional life.
Prerequisites: ACCT 328; junior or senior classification.

ACCT 484 Accounting Internship
Credits 3. 6 Other Hours.
A practicum in accounting under the supervision of accounting practitioners; one semester program for each student participant. Free elective only and must be taken on a satisfactory/unsatisfactory basis.
Prerequisites: Accounting major and approval of department head.

ACCT 485 Directed Studies
Credits 1 to 3. 1 to 3 Other Hours.
Directed study of selected problems in the area of accounting not covered in other courses.
Prerequisites: Accounting major and approval of department head.
ACCT 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of accounting. May be repeated for credit.
Prerequisites: Admission to upper division in Mays Business School and approval of instructor.

ACCT 491 Research
Credits 1 to 4. 1 to 4 Lecture Hours.
Research conducted under the direction of an accounting faculty member in Mays Business School or a faculty member in the Office of Undergraduate Research. May be repeated one time for credit.
Prerequisites: Junior or senior classification and approval of instructor.

ACCT 603 Energy Accounting
Credits 3. 3 Lecture Hours.
Overview of the oil and gas industry and specialized financial accounting procedures associated with the industry; emphasis on accounting for exploration, development, production, depletion and amortization as well as joint operations, asset impairment and retirement obligation; includes reserve accounting/disclosure related to the above topics.
Prerequisites: ACCT 327 with C or better.

ACCT 607 Seminar in Auditing
Credits 3. 3 Lecture Hours.
Current issues and research in auditing, attestation and financial disclosures. Classification 6 students may not enroll in this course.
Prerequisite: ACCT 407 or equivalent.

ACCT 610 Financial Accounting
Credits 1 to 3. 1 to 3 Lecture Hours.
Develops a conceptual framework for understanding and using corporate financial statements. Oriented towards the user of financial accounting data (rather than the preparer) and emphasizes the reconstruction of economic events from published financial data. May be repeated for up to 3 hours credit. Classification 6 students may not enroll in this course.
Prerequisite: Enrollment is limited to BUAD classification 7 graduate students.

ACCT 611 Management of Taxation
Credits 3. 3 Lecture Hours.
Various income taxes on taxable entities. For business and other majors. Classification 6 students may not enroll in this course.

ACCT 612 Partnership and Real Estate Taxation
Credits 3. 3 Lecture Hours.
Concepts and principles of partnerships and real estate taxation; use of partnerships and real estate for tax planning. Classification 6 students may not enroll in this course.
Prerequisite: ACCT 405.

ACCT 615 Contemporary Tax Topics
Credits 3. 3 Lecture Hours.
Explores business tax topics that provide current/future significant professional tax service opportunities such as specialized applications of business taxation. Intended for graduate students in the Tax Track in the Professional Program in Accounting. May be taken two times for credit.
Prerequisite: ACCT 611.

ACCT 620 Management Accounting and Control
Credits 1 to 3. 1 to 3 Lecture Hours.
Applications of concepts useful to management, in the analysis of accounting data for the purposes of costing and income determination, decision making and control of various organizational activities. May be repeated for up to 3 hours credit. Classification 6 students may not enroll in this course.
Prerequisite: ACCT 610 or equivalent. Enrollment is limited to BUAD classification 7 graduate students.

ACCT 621 Corporate Taxation I
Credits 3. 3 Lecture Hours.
Formation and capital structures, partial liquidations, S corporations, accumulated earnings tax, personal holding companies and other topics. Classification 6 students may not enroll in this course.
Prerequisite: ACCT 405 or equivalent.

ACCT 628 Business Application Modeling
Credits 3. 3 Lecture Hours.
Focuses on modeling application software commonly used in accounting and business; primary emphasis on Visual Basic for Applications in Microsoft Excel and Access; application exercises will deal with financial problem solving. Classification 6 students may not enroll in this course.
Prerequisite: ACCT 427 or equivalent.

ACCT 629 Controls and Audit Technology
Credits 3. 3 Lecture Hours.
Focuses on internal controls and their importance with regards to financial reporting and arrangement; topics include process walkthrough techniques, documentation, business processes, control frameworks, application controls, change management, operations management and security.
Prerequisite: ACCT 407.

ACCT 640 Accounting Concepts and Procedures I
Credits 3. 3 Lecture Hours.
Accounting concepts and relationships essential to administrative decisions; use of accounting statements and reports as policymaking and policy execution tools. Classification 6 students and non-business graduate students may enroll in this course.
Prerequisite: Graduate classification.

ACCT 644 Control and Audit of Information Systems
Credits 3. 3 Lecture Hours.
Focuses on the control, audit, and security of information systems; aimed at enhancing the ability of accounting professionals to deal with complex computer-based accounting systems as auditors of these systems; topics include general and application controls, audit software, and e-commerce security.
Prerequisite: ACCT 427; graduate classification.

ACCT 646/IBUS 646 International Accounting
Credits 3. 3 Lecture Hours.
Introduction and examination of accounting issues unique to multinational enterprises and international business activity. Classification 6 students may not enroll in this course.
Prerequisites: ACCT 328; FINC 341.
Cross Listing: IBUS 646/ACCT 646.

ACCT 647/FINC 647 Financial Statement Analysis
Credits 3. 3 Lecture Hours.
Analytical approach to financial statements; application of finance and accounting principles relevant to the analysis of financial statements. Classification 6 students may not enroll in this course.
Prerequisites: ACCT 610 or 640; FINC 612 or 635.
Cross Listing: FINC 647/ACCT 647.
ACCT 648 Accounting Information Systems
Credits 3. 3 Lecture Hours.
Design, implementation, operation, control and audit techniques of accounting information systems. Classification 6 students may not enroll in this course.
Prerequisite: ACCT 427 or equivalent.

ACCT 650 Accounting Ethics
Credits 3. 3 Lecture Hours.
Integration of ethical reasoning, objectivity, independence and other core values into the development of a professional accountant; critical analysis of the ethical lapses which have occurred in business and the accounting profession; explores ways to integrate ethical behavior into professional life.
Prerequisite: Graduate classification.

ACCT 651 Development of Accounting Thought
Credits 3. 3 Lecture Hours.
Examination of contemporary financial reporting issues in terms of institutional, ethical, and regulatory environment; framework for exercising judgment when literature provides no direct prescription about correct reporting. Tools used include unstructured cases and open-ended research assignments. Course not open to classification 6 students.
Prerequisite: ACCT 642 or approval of instructor.

ACCT 660 Accounting Information and Financial Markets
Credits 3. 3 Lecture Hours.
Financial accounting research with emphasis on financial markets; investigates major areas of financial accounting research, related statistical techniques and the progress of research in a historical perspective. Classification 6 students may not enroll in this course.
Prerequisite: ACCT 665 or approval of instructor.

ACCT 665 Research Methodology I
Credits 3. 3 Lecture Hours.
Nature and evaluation of accounting research; includes preparation and evaluation of original research papers. Classification 6 students may not enroll in this course.
Prerequisite: Doctoral classification.

ACCT 671 Contemporary Accounting Topics
Credits 1 to 3. 1 to 3 Lecture Hours.
Current issues and research in topical areas: financial data audit and control; international accounting; accounting for natural resources; tax planning, theory and structure of taxation. Classification 6 students may not enroll in this course.
Prerequisite: Approval of instructor.

ACCT 680 Tax Research and Policy
Credits 3. 3 Lecture Hours.
Methodology and sources of tax research; tax analysis research, policy implications, behavioral aspects and use of quantitative analysis. Classification 6 students may not enroll in this course.
Prerequisite: ACCT 405 or 611.

ACCT 684 Professional Internship
Credits 1 to 6. 1 to 6 Other Hours.
A directed internship in an organization to provide students with on-the-job training with professionals in organizational settings appropriate to the student's professional objectives. Classification 6 students may not enroll in this course.
Prerequisites: Approval of committee chair and department head.

ACCT 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed individual study of selected problems using recent developments in business research methods. Classification 6 students may not enroll in this course.
Prerequisites: Graduate classification and approval of instructor.

ACCT 688 Doctoral Seminar
Credits 3. 3 Other Hours.
Historical development of the conceptual framework of accounting theory and practices; analysis of current research and controversial issues in the field. For doctoral students only. May be repeated for credit. Classification 6 students may not enroll in this course.
Prerequisite or corequisite: ACCT 665.

ACCT 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 1 to 4 Lab Hours.
Selected topics in an identified area of accounting. May be repeated for credit. Classification 6 students may not enroll in this course.

ACCT 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research for thesis or dissertation. Classification 6 students may not enroll in this course.

### AERO - Aerospace Engineering

#### Courses

**AERO 101 Introduction to Aerospace Engineering**
Credit 1. 1 Lecture Hour.
Overview of aerospace engineering and the aerospace industry, including requirements and assignments of an aerospace engineer, vehicle configurations and missions, aerodynamics, structures and materials, dynamics and control, simulation and testing, and aerospace engineering in the future.
Prerequisites: ENGR 111, MATH 151, MATH 152, MATH 251, MATH 253, PHYS 218, or registration therein.

**AERO 201 Introduction to Flight**
Credits 3. 3 Lecture Hours. 1 Lab Hour.
Standard atmosphere; basic aerodynamic theory; isentropic flow; airfoil and wing descriptions; distributed load systems; static equilibrium; free body diagrams; wing structures; elementary aerospace vehicle performance; aircraft stability and control; experiential introduction to aerospace engineering.
Prerequisites: Admitted to major degree sequence in aerospace engineering; grade of C or better ENGR 111, MATH 151, MATH 152, MATH 251 or MATH 253 or registration therein.

**AERO 210 Introduction to Aerospace Mechanics**
Credits 3. 3 Lecture Hours. 1 Lab Hour.
Planar kinematics; fundamentals of Newtonian mechanics; system of particles and rigid bodies; the effect of friction forces on motion and static equilibrium; rectilinear and curvilinear motion of particles; translational momentum; moments of inertia; angular momentum; planar motion of rigid bodies; impact dynamics; situations involving variable mass; introduction to orbital mechanics.
Prerequisites: Grade of C or better AERO 201; grade of C or better in MATH 308 or registration therein.
AERO 212 Introduction to Aerothermodynamics  
Credits 3. 3 Lecture Hours. 1 Lab Hour.  
Study of thermodynamic properties and processes, heat and work, first and second laws of thermodynamics, power and refrigeration ideal cycles, psychrometrics.  
**Prerequisites:** Grade of C or better in CHEM 107, CHEM 117; grade of C or better in AERO 201 and MATH 251, or registration therein.  

AERO 214 Introduction to Aerospace Mechanics of Materials  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Fundamental concepts for deformable bodies (conservation of linear and angular momentum, kinematics and thermoelasticity); notions of stress and strain and illustrative examples for engineering applications; introduction to experimental methods and reporting, instrumentation and uncertainty analysis; measurement of elastic and thermal material properties.  
**Prerequisites:** Grade of C or better in PHYS 208; grade of C or better in AERO 210 and MATH 308, or registration therein.  

AERO 220 Introduction to Aerospace Computation  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Review of basic skills required for developing computer programs and introduction to more advanced concepts in scientific computing to solve aerospace engineering problems; numerical and analytical methods of solving engineering problems involving curve fitting; interpolation and extrapolation; difference operators and differentiation; integration; solutions to linear and non-linear equations and differential equations with engineering applications.  
**Prerequisites:** Grade of C or better in AERO 201, ENGR 112; grade of C or better in MATH 308 or registration therein.  

AERO 289 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified area of aerospace engineering. May be repeated for credit.  
**Prerequisite:** Approval of instructor.  

AERO 291 Research  
Credits 1 to 4. 1 to 4 Other Hours.  
Research conducted under the direction of faculty member in aerospace engineering. May be repeated 3 times for credit.  
**Prerequisites:** Freshman or sophomore classification and approval of instructor.  

AERO 301 Theoretical Aerodynamics  
Credits 3. 3 Lecture Hours.  
Fundamentals of incompressible flow, conservation principles, continuity, momentum, rotationality, circulation, lift, drag, potential flow, thin airfoil theory, panel methods, airfoil design, high lift devices, finite wing theory, vortex lattice methods, and wing design.  
**Prerequisites:** Grade of C or better in AERO 212, AERO 220, MATH 308.  

AERO 302 Aerospace Engineering Laboratory  
Credits 2. 1 Lecture Hour. 3 Lab Hours.  
Intermediate and advanced topics in instrumentation, signal conditioning, data acquisition analysis for aerospace-related measurements; emphasis on technical reporting and data presentation: measurements of materials strain, deformation, pressure, velocity and aerodynamic forces; experimental investigations of static and dynamic response of structures; use of nonintrusive optical techniques; uncertainty analysis; linear regression, Fourier transform and power spectra; tests for statistical significance.  
**Prerequisites:** Grade of C or better in ENGL 104; grade of C or better in AERO 301, AERO 304, AERO 310, ECEN 215, or registration therein.  

AERO 303 High Speed Aerodynamics  
Credits 3. 3 Lecture Hours.  
Fundamentals of compressible flow, acoustic waves, shock and expansion waves, shock-expansion theory, supersonic airfoil design, small perturbation theory, conical flow theory, supersonic wing panel methods, supersonic wing design, similarity theory, cone flow, unsteady waves, and theory of characteristics.  
**Prerequisite:** Grade of C or better in AERO 301.  

AERO 304 Aerospace Structural Analysis I  
Credits 3. 3 Lecture Hours.  
Structural design considerations; mechanics of structures; introduction to elasticity; constitution of materials; analysis of typical aerospace structures in bending, extension, torsion and shear.  
**Prerequisites:** Grade of C or better in AERO 214, AERO 220, MATH 308.  

AERO 306 Aerospace Structural Analysis II  
Credits 3. 3 Lecture Hours.  
Work and energy principles; analysis of indeterminate structures by classical virtual work and finite elements; introduction to elastic stability of columns; application of energy methods to determine stresses, strains and displacements in typical aerospace structures; design considerations in aerospace structures.  
**Prerequisite:** Grade of C or better in AERO 304.  

AERO 310 Aerospace Dynamics  
Credits 3. 3 Lecture Hours.  
Spatial kinematics; general motion of particles; Euler angles; Newton-Euler methods for translation and rotation of rigid bodies; work-energy and impulse momentum principles applied to aerospace systems; Linear theory of free and forced vibrations and dynamic response of single and multi-degree of freedom systems; frequency response of first and second order systems with instrumentation applications.  
**Prerequisites:** Grade of C or better in AERO 210, AERO 214, AERO 220, MATH 308.  

AERO 321 Dynamics of Aerospace Vehicles  
Credits 3. 3 Lecture Hours.  
Derivation of the nonlinear flight dynamics equations; linearization; aircraft static stability and control; longitudinal and lateral dynamic stability; development of state-space models; stability derivatives; longitudinal and lateral modes and transfer functions; flying qualities; elements of configuration design; response to control inputs.  
**Prerequisites:** Grade of C or better in AERO 301 and AERO 310.  

AERO 351 Aerothermodynamics and Propulsion  
Credits 3. 3 Lecture Hours.  
Aerothermodynamics of gases; laws of thermodynamics; equilibrium conditions; mixtures of gases; combustion and thermochemistry; compressible internal flows with friction, heat transfer and shock; turbojet cycle analysis and performance; chemical rockets.  
**Prerequisite:** Grade of C or better in AERO 303 or registration therein.  

AERO 401 Aerospace Vehicle Design I  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Aerodynamic design, specification, arrangement, performance analysis, weight and balance, stability.  
**Prerequisites:** Grade of C or better in AERO 302, AERO 303, AERO 306, AERO 321, AERO 351.  

AERO 402 Aerospace Vehicle Design II  
Credits 2. 6 Lab Hours.  
Continuation of AERO 401. System optimization by examination and analysis of necessary trade-offs.  
**Prerequisite:** Grade of C or better in AERO 401.
AERO 404 Mechanics of Advanced Aerospace Structures
Credits 3.3 Lecture Hours.
Advanced analysis techniques for aerospace structures; material anisotropy, plasticity, fatigue and fracture; laminated materials; solution of plane elasticity, plate and multi-component structural configurations; buckling of beams and plates; application of finite element analysis.
Prerequisites: Grade of C or better in AERO 304 and junior or senior classification.

AERO 405 Aerospace Structural Design
Credits 3.3 Lecture Hours.
Overall structural integrity of complete aerospace systems; structures subjected to critical loads; design considerations in aerospace structures.
Prerequisite: Grade of C or better in AERO 306.

AERO 406 Polymer Nanocomposites and their Applications
Credits 3.3 Lecture Hours.
Recent advances and methodologies in processing and characterization of nanostructured polymers and nanocomposites, as well as their commercial applications; investigate polymers filled with nanometer-size inclusions, including nanoparticles, nanotubes, nanofibers, and nano-clays; macroscale, microscale and nanoscale characterizations investigated in relation to properties of interest.
Prerequisites: Grade of C or better in AERO 413.

AERO 410 Aeroelasticity
Credits 3.3 Lecture Hours.
Classical analysis of fundamental aeroelastic phenomena with application to aerospace vehicles; flutter, divergence, control effectiveness.
Prerequisites: Grade of C or better in AERO 303, AERO 306, AERO 310.

AERO 419 Chemical Rocket Propulsion
Credits 3.3 Lecture Hours.
Nozzles and heat transfer in rockets, liquid and solid propellant systems; combustion and combustion stability; flight performance including trajectories, multistaging and exchange rate curves; rocket testing.
Prerequisite: Grade of C or better in AERO 351.

AERO 420 Numerical Simulation
Credits 3.3 Lecture Hours.
Numerical and analytical simulation of physical problems in sciences and engineering using applied methods; developing and using numerical techniques for physical problems described by nonlinear algebraic equations, ordinary and partial differential equations.
Prerequisite: Grade of C or better in AERO 220 or MATH 417.

AERO 421 Active Controls for Aerospace Vehicles
Credits 3.3 Lecture Hours.
Introduction to the Theory of Automatic Control specifically applied to aerospace vehicles; techniques for analysis and synthesis of linear control systems, stability criteria, systems response and performance criteria; design studies of active controls to improve aerospace vehicle performance.
Prerequisite: Grade of C or better in AERO 321.

AERO 422 Active Controls for Aerospace Vehicles
Credits 3.3 Lecture Hours.
Introduction to the Theory of Automatic Control specifically applied to aerospace vehicles; techniques for analysis and synthesis of linear control systems, stability criteria, systems response and performance criteria; design studies of active controls to improve aerospace vehicle performance.
Prerequisite: Grade of C or better in AERO 321.

AERO 423 Orbital Mechanics
Credits 3.3 Lecture Hours.
Rocket fundamentals; trajectories including aerodynamics, gravity turn and trajectory optimization, orbital mechanics, orbit lifetimes, three-body problem, orbit perturbations.
Prerequisite: Grade of C or better in AERO 321.

AERO 424 Spacecraft Attitude Dynamics and Control
Credits 3.3 Lecture Hours.
Introduces fundamental concepts of satellite attitude dynamics and control; includes derivations of environmental disturbances due to gravity gradient, aerodynamic, and solar radiation pressure; includes treatments of attitude control subsystems, such as thrusters, reaction wheels, CMGs, and magnetic torquers, and their designs.
Prerequisites: Grade of C or better in AERO 321.

AERO 425 Flight Test Engineering
Credits 3.2 Lecture Hours. 3 Lab Hours.
Application of performance and stability and control theory to flight test measurements; standard atmosphere and airspeed equations for pilo-static system calibrations; flight test methods for evaluating performance, stability and control, and stall-spin characteristics; laboratory practice in planning and conducting small flight test project.
Prerequisite: Grade of C or better in AERO 321.

AERO 426 Space System Design
Credits 3.3 Lecture Hours.
Introduces prevailing practices and processes used in modern space system design; applies knowledge in component engineering disciplines to a design challenge of interest to NASA or DoD; utilizes instruction in systematic methods of design and on dynamics of teamwork; when possible concludes with detailed design using an engineering design facility.
Prerequisites: Grade of C or better in AERO 306, AERO 321, AERO 351.

AERO 428 Electromagnetic Sensing for Space-Borne Imaging
Credits 3.3 Lecture Hours.
Study IR and Visible range imaging systems to obtain high resolution imaging of objects from space; this area has numerous applications and areas of advanced development; following instruction in needed background on optics, telescopes, and interferometry, perform preliminary design of imaging system with a different imaging design offered each year.
Prerequisites: Grade of C or better in AERO 306, AERO 321, AERO 351.

AERO 430 Numerical Simulation
Credits 3.3 Lecture Hours.
Numerical and analytical simulation of physical problems in sciences and engineering using applied methods; developing and using numerical techniques for physical problems described by nonlinear algebraic equations, ordinary and partial differential equations.
Prerequisite: Grade of C or better in AERO 220 or MATH 417.

AERO 431 Aerothermochemistry
Credits 3.3 Lecture Hours.
Composition of chemically reacting gases (air and propellant); thermodynamic functions based on classical and quantum mechanical theories; calculation of gas temperatures; equilibrium, frozen and nonequilibrium flows through nozzles and shock waves.
Prerequisite: Grade of C or better in AERO 303.
AERO 440 Cockpit Systems and Displays  
**Credits 3.3 Lecture Hours.**
Design, development, and implementation of cockpit systems and multifunction displays; cockpit system requirements and specifications; human-machine interfaces, Flight Management Systems, navigation and guidance systems; 3-D real-time displays of weather, traffic, and terrain; characteristics and missions of air vehicles; project design and cost analysis.  
**Prerequisite:** Grade of C or better in AERO 321 or junior or senior classification in computer science.

AERO 445 Vehicle Management Systems  
**Credits 3.3 Lecture Hours.**
Introduction to vehicle management systems for manned and unmanned air and space vehicles; system centric concepts, requirements definition, specifications, and architectures; reliability analysis, health monitoring, and mission management; SISO digital design of integrated flight control, propulsion control and structural control; introduction to vehicle autonomy; design and analysis methods, industrial examples.  
**Prerequisite:** Grade of C or better in AERO 422.

AERO 452 Heat Transfer and Viscous Flows  
**Credits 3.3 Lecture Hours.**
Navier-Stokes and boundary layer equations; exact and approximate solutions; laminar boundary layers; origin of turbulence; transition; turbulent boundary layers; viscous airfoil design; one and two dimensional heat transfer; methods for steady and transient heat conduction; thermal boundary layers; convection; and radiation.  
**Prerequisite:** Grade of C or better in AERO 351.

AERO 472 Airfoil and Wing Design  
**Credits 3.3 Lecture Hours.**
Subsonic airfoil design and analysis, subsonic wing design and analysis, swept and delta wings, vortex lift, transonic flow methods, viscous transonic phenomena, transonic airfoil and wing design, supersonic panel methods, supersonic wing design, optimization.  
**Prerequisite:** Grade of C or better in AERO 303.

AERO 481 Seminar  
**Credit 1.1 Lecture Hour.**
Readings, reports, conferences and discussion. Must be taken on a satisfactory/unsatisfactory basis.  
**Prerequisite:** Senior classification in aerospace engineering.

AERO 485 Directed Studies  
**Credits 1 to 4.1 to 4 Other Hours.**
Special problems in aerospace engineering assigned to individual students or groups.  
**Prerequisites:** Senior classification; approval of department head.

AERO 489 Special Topics in...  
**Credits 1 to 4.1 to 4 Lecture Hours. 0 to 4 Lab Hours.**
Selected topics in an identified field of aerospace engineering. May be repeated for credit.  
**Prerequisite:** Approval of instructor.

AERO 491 Research  
**Credits 1 to 4.1 to 4 Other Hours.**
Research conducted under the direction of faculty member in aerospace engineering. May be repeated 3 times for credit.  
**Prerequisites:** Junior or senior classification and approval of instructor.

AERO 601 Advanced Aerodynamics  
**Credits 3.3 Lecture Hours.**
Theoretical and approximate numerical solutions for incompressible and transonic flows and applications to airfoil, wing and whole-vehicle aerodynamics; approximate methods for boundary layers; introduction to aerodynamic design concepts; design of swept wings and delta wings, control surfaces, winglets, vortex generators and flow control.  
**Prerequisite:** Approval of instructor.

AERO 602 The Theory of Fluid Mechanics  
**Credits 4.3 Lecture Hours. 3 Lab Hours.**
Entry-level graduate course on the theory of fluid mechanics, with emphasis on viscous subsonic flows; concepts of boundary layer theory, flow stability, transition and turbulence; laboratory includes elements of measurement techniques, numerical methods and physical modeling.  
**Prerequisite:** MATH 601 or registration therein.

AERO 603/MEMA 602 Continuum Mechanics  
**Credits 3.3 Lecture Hours.**
Development of field equations for analysis of continua (solids as well as fluids); conservation laws; kinematics, constitutive behavior of solids and fluids; applications to aerospace engineering problems involving solids and fluids.  
**Prerequisite:** Graduate classification.

**Cross Listing:** MEMA 602/AERO 603.

AERO 605/MEEN 603 Theory of Elasticity  
**Credits 3.3 Lecture Hours.**
Analysis of stress and strain in two- and three-dimensions, equilibrium and compatibility equations, strain energy methods; torsion of noncircular sections; flexure, axially symmetric problems.  
**Prerequisite:** graduate or senior undergraduate standing.  
**Cross Listing:** MEEN 603/AERO 605.

AERO 606 Multifunctional Materials  
**Credits 3.3 Lecture Hours.**
In-depth analysis of multifunctional materials and composites, and their novel applications.  
**Prerequisites:** MEMA 602/AERO 603/AERO 603/MEMA 602, MSEN 601.  
**Cross Listing:** MEMA 606 and MSEN 606.

AERO 608 Nanomechanics  
**Credits 3.3 Lecture Hours.**
Application of mechanics concepts to nano-scale behavior of materials. Review of continuum mechanics; Extensions to generalized continua; Nonlocal elasticity; Nano-scale plasticity. Focus on multi-scale modeling: Dislocation Dynamics; Quasi-Continuum method; Molecular dynamics with introductions to quantum mechanics and statistical mechanics.  
**Prerequisite:** AERO 603/MEMA 602.  
**Cross Listing:** MEMA 608 and MSEN 608.

AERO 609 Nanomechanics in Engineering  
**Credits 3.3 Lecture Hours.**
Concepts of sustainability with associated metrics; application of systems engineering tools to facilitate assessment of viable options on products and processes; assessment of impact on the entire biosphere; product life cycle analysis.  
**Prerequisite:** Graduate classification.

AERO 615 Numerical Methods for Internal Flow  
**Credits 3.3 Lecture Hours.**
Methods for solving internal flow problems; viscous and inviscid compressible flow, Euler/Navier Stokes solvers, boundary conditions.  
**Prerequisite:** MATH 601 or approval of instructor.
AERO 616 Damage and Failure in Composite Materials
Credits 3.3 Lecture Hours.
Mechanisms and models related to damage and failure in composite materials subjected to mechanical loads.
Prerequisite: Courses in composite materials, elasticity.
Cross Listing: MEMA 616 and MSEN 636.
AERO 617/MEMA 625 Micromechanics
Credits 3.3 Lecture Hours.
Eigenstrains; inclusions, and inhomogeneities; Eshelby’s solution for an ellipsoidal inclusion; Eshelby’s equivalent inclusion method. Effective elastic properties of composites; composite spheres and cylinders models; bounds on effective moduli; Hashin-Shtrikman bounds; applications to fiber, whisker and particulate reinforced composites; introduction to micromechanics of inelastic composites and solids with damage.
Prerequisites: MEMA 602/AERO 603, or AERO 603/MEMA 602, AERO 605/MEEN 603.
Cross Listing: MEMA 625/AERO 617.
AERO 618/MEMA 626 Mechanics of Active Materials
Credits 3.3 Lecture Hours.
Introduction to coupled field theories: constitutive response of materials with thermal and electromagnetic coupling; microstructural changes due to phase transformations; shape memory alloys; piezoelectric and magnetostrictive materials; active polymers and solutions. Micromechanics of active composites.
Prerequisites: MEMA 602/AERO 603.
Cross Listing: MEMA 626/AERO 618.
AERO 620 Unsteady Aerodynamics
Credits 3.3 Lecture Hours.
Theoretical formulation of unsteady airfoil theory and techniques used for determining airloads on oscillating lift surfaces; exact solutions and various approximations presented and evaluated; application to problems of unsteady incompressible, subsonic and transonic flows about airfoils and wings.
Prerequisite: Approval of instructor.
AERO 621 Aeromechanics of Wind Turbines
Credits 3.3 Lecture Hours.
Solid and fluid mechanics concepts applied to aerodynamics and aeroelasticity of wind turbine blades; failure analysis and structural design; composites and hybrid materials.
Prerequisite: Graduate Classification.
AERO 622 Spacecraft Dynamics and Control
Credits 3.3 Lecture Hours.
Elements of analytical dynamics; modeling different types of spacecraft and control systems; sensors, and actuators; stability; control system design; effects of flexibility; attitude and orbital coupling; environmental effects.
Prerequisites: AERO 422 or ECEN 420.
AERO 623 Optimal Spacecraft Attitude and Orbital Maneuvers
Credits 3.3 Lecture Hours.
Application of optimization and optimal control techniques to spacecraft maneuver problems; computation of open loop and feedback controls for linear and nonlinear spacecraft dynamical systems; low-thrust and impulsive control, discretization methods, case studies.
Prerequisite: AERO 423 or equivalent.
AERO 624 Celestial Mechanics
Credits 3.3 Lecture Hours.
Analytical and numerical methods for computing spacecraft orbits under the influence of gravitational, aerodynamic, thrust and other forces; Keplerian two-body problem, perturbation methods, orbit determination, navigation and guidance for aerospace vehicles.
Prerequisite: AERO 423 or equivalent.
AERO 625 Modern Control of Aerospace Systems
Credits 3.3 Lecture Hours.
Linear and nonlinear controllers for aircraft and spacecraft; state and output feedback of sampled-data control systems; feedback linearization and dynamic inversion; direct sampled-data design using optimal MIMO techniques; sensing considerations, sources and modeling of uncertainties unique to aircraft and spacecraft, robustness analysis.
Prerequisite: AERO 422 or equivalent.
AERO 626 Estimation of Dynamic Systems
Credits 3.3 Lecture Hours.
Traditional concepts and recent advances in estimation related to modern dynamic systems found in aerospace disciplines; least squares estimation, state estimation, nonlinear filtering, aircraft position and velocity tracking, attitude determination of spacecraft vehicles, gyro bias estimation and calibration.
Prerequisites: AERO 310 or equivalent; STAT 211 or equivalent.
AERO 627 Principles of Structural Dynamics
Credits 3.3 Lecture Hours.
Examination of flexible structures through a review of single degree-of-freedom dynamical systems followed by an in-depth study of continuous and multiple degree-of-freedom systems; emphasis on discrete modeling of structures for vibration analysis and dynamic analysis, with minimal development of methods such as finite elements.
Prerequisite: Graduate classification.
AERO 628 Advanced Spacecraft Dynamics and Control
Credits 3.3 Lecture Hours.
Review of fundamental principles; introduction to alternate and advanced methods of dynamics and control for aerospace systems; alternate methods for generating and analyzing equations of motion; techniques for complex multibody systems; variable speed control moment gyros; method of quadratic modes; focus on modeling techniques for aerospace systems.
Prerequisite: AERO 622.
AERO 629 Experimental Aerodynamics
Credits 3.3 Lecture Hours.
Review of fundamental principles in aerodynamics; basics of instrumentation, electronics, data-acquisition; experimental techniques in aerodynamics/fluid mechanics; pressure, skin friction, force and velocity measurement techniques in wind and water-tunnel testing; conventional and novel techniques in data-processing and systems modeling; smart systems in experimental aerodynamics.
Prerequisite: AERO 601.
AERO 630 Introduction to Random Dynamical Systems
Credits 3.3 Lecture Hours.
Building on basic probability theory, course covers theory and applications of discrete and continuous random processes. Particular attention shall be paid to the response of dynamical systems (discrete, linear and nonlinear), to random input processes and their application to Engineering Systems.
Prerequisite: Graduate classification.
AERO 631 Model Predictive Control for Aerospace Systems
Credits 3. 3 Lecture Hours.
Nonlinear optimal control and optimization, optimal control theory, dynamical systems stability and control, approximation theory, convex optimization; control of engineering systems with state and control constraints with parametric uncertainty; formulate optimal control problems, solve as nonlinear programming problems using available solvers; requires background in control theory.
Prerequisites: Graduate classification and AERO 623 or comparable course.

AERO 632 Design of Advanced Flight Control Systems - Theory and Application
Credits 3. 3 Lecture Hours.
Modeling, analysis, design and implementation of advanced flight control problems, specifically aerospace engineering applications; includes choice of controlled variables, reduction of controlled variables, design methodology, computational framework, implementation issues, and software environments using various toolboxes.
Prerequisites: Graduate classification and approval of instructor.

AERO 633 Advanced Aerospace Multibody Dynamics
Credits 3. 3 Lecture Hours.
Techniques for modeling, simulation, and analyzing multibody dynamical systems; includes development of kinematic expressions for articulating bodies, adding and constraining degrees of freedom through mappings; familiarization with industry codes, such as DISCOS; appreciation of learned techniques on various systems, including omni-directional vehicles, Stewart platforms, and gyroscopically-stabilized walking robots.
Prerequisites: AERO 622 or graduate classification and approval of instructor.

AERO 640 Turbulence Processes
Credits 3. 3 Lecture Hours.
Fundamentals of conservation, Lagrangian, transformation, variance properties; flow features: laminar, transition, turbulence regimes, characteristics, spectrum; statistical (filter/average) description: scales, Reynolds, arbitrary averaging, realizability; elementary turbulence processes: viscous, advective/inertial, role of pressure; elementary process models, viscous RDT, RDT for velocity gradients, equipartion of energy, restricted Euler equations; isotropic, homogeneous turbulence. May be taken 2 times for credit.

AERO 641 High-Speed Combustion for Propulsion
Credits 3. 3 Lecture Hours.
Study topics in combustion relevant to high-speed subsonic/supersonic air-breathing propulsion; emphasis on the structure of detonations and the operation of combustors under supersonic conditions; structure of shockwaves and the mixing/chemical kinetics that take place in high speeds.
Prerequisite: Graduate classification.

AERO 642 Laser Diagnostics for Combustion and Propulsion
Credits 3. 3 Lecture Hours.
Laser diagnostics topics as applied to combustion and propulsion: brief exposition of fundamental electromagnetic theory; practice of basic experimental laser techniques used to measure thermodynamics; basic implementation of Raman and Rayleigh scatterings; Laser-Induced Fluorescence (LIF); detection methods, optical systems, noise contributions, and signal enhancement techniques will be discussed.
Prerequisite: Graduate classification.

AERO 643 High-Performance Computational Fluid Dynamics
Credits 3. 3 Lecture Hours.
Numerical simulations of fluid dynamics problems on massively parallel computers; focus on Direct Numerical Simulations (DNS) where all dynamically relevant scales are resolved; elements of both high-performance computing (HPC) and numerical methods to solve incompressible and compressible flows.
Prerequisite: AERO 615 or approval of instructor.

AERO 649/EMA 649 Generalized Finite Element Methods
Credits 3. 3 Lecture Hours.
Systemic introduction to the theory and practice of generalized finite element (FE) methods, including GFEM, the hp-cloud method, particle methods, and various meshless methods with similar character; precise formulation of the methods are presented; known theoretical results for convergence; important issues related to implementation, issues of numerical integration.
Prerequisite: Graduate classification.
Cross Listing: MEMA 649/AERO 649.

AERO 650 Spacecraft Attitude Determination
Credits 3. 3 Lecture Hours.
Spacecraft attitude determination systems; attitude and error parameterizations, attitude sensors, data processing and calibration; introduction to single- and three- axis attitude determination and to optimal attitude and error estimation: ECI motion and time definitions.
Prerequisite: AERO 423 or equivalent.

AERO 660 Nonlinear Flight Dynamics
Credits 3. 3 Lecture Hours.
Nonlinear equations of motion for coupled aircraft motions; coupled aerodynamic phenomena; application of the direct method of Lyapunov to nonlinear aircraft motions; elastic airplane equations of motion.
Prerequisite: AERO 421 or approval of instructor.

AERO 661 Optical Methods in Aerospace Engineering
Credits 3. 3 Lecture Hours.
Analysis and design of imaging and interferometric instruments for flight in and above the atmosphere and ground-based observation of orbiting objects; assessment of optical component and system performance.
Prerequisite: Graduate classification.

AERO 670 Turbulence Modeling
Credits 3. 3 Lecture Hours.
Identification of physical features that render Navier-Stokes equation difficult to compute or model; includes Reynolds-averaged and filtered Navier-Stokes equations for unresolved stresses; development of closure models for pressure-strain correlation, dissipation and turbulent transport Reynolds; algebraic Reynolds stress modeling, Large Eddy Simulations (LES) and hybrid methods; validation and prediction studies.
Prerequisites: AERO 640 and graduate classification or approval of instructor.

AERO 672 Perturbation Methods in Mechanics
Credits 3. 3 Lecture Hours.
Develop approximate solutions to algebraic, differential, and integral equations; analysis of nonlinear oscillations, nonlinear waves, and boundary-layers; emphasis on combined numerical/perturbations techniques and reducing Partial Differential Equation (PDE) to Ordinary Differential Equation (ODE).
Prerequisites: Graduate classification in aerospace, mechanical or civil engineering.
AERO 673 Boundary Layer Stability and Transition
Credits 3. 3 Lecture Hours.
Analytical, numerical, and experimental methods for the stability of bounded shear flows; includes techniques for estimating transition to turbulence and the control of transition through laminar flow control.  
Prerequisites: Graduate classification and AERO 601, 602, or 603 or approval of instructor.

AERO 674 Hypersonic Flow
Credits 3. 3 Lecture Hours.
Theoretical formulation of hypersonic flow theory; techniques for hypersonic flowfield analysis; high temperature effects, including both equilibrium and nonequilibrium flows; classical and modern computational methods.  
Prerequisite: AERO 303 or equivalent.

AERO 676 Aerothermochemistry
Credits 3. 3 Lecture Hours.
Fundamentals of kinetic theory, chemical thermodynamics and statistical mechanics; applications to high temperature chemically reacting equilibrium and nonequilibrium aerodynamic flows.  
Prerequisite: AERO 303 or equivalent.

AERO 681 Seminar
Credit 1. 1 Lecture Hour.
Selected research topics presented by the faculty, students and outside speakers.  
Prerequisite: Graduate classification.

AERO 684 Professional Internship
Credits 1 to 4. 1 to 4 Other Hours.
Engineering research and design experience at government or industry facilities away from the Texas A&M campus; design projects supervised by faculty coordinators and personnel at these locations; projects selected to match student's area of specialization.  
Prerequisites: Graduate classification and approval of committee chair and department head.

AERO 685 Directed Studies
Credits 1 to 12. 1 to 12 Other Hours.
Special topics not within scope of thesis research and not covered by other formal courses.  
Prerequisite: Graduate classification in aerospace engineering.

AERO 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of aerospace engineering. May be repeated for credit.  
Prerequisite: Approval of instructor.

AERO 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Technical research projects approved by department head.

AERS - Aerospace Studies

Courses

AERS 101 Foundations of the USAF
Credit 1. 1 Lecture Hour.
Introduction to the U.S. Air Force and the Air Force Reserve Officer Training Corps (AFROTC); includes Officership, professionalism, military customs and courtesies, and officer opportunities and benefits; AFROTC cadets must register for Leadership Laboratory (AERS 106) as it complements this course with followership experience.

AERS 102 Foundations of the USAF
Credit 1. 1 Lecture Hour.
Continuation of AERS 101; AFROTC cadets must register for Leadership Laboratory (AERS 106) as it complements this course with followership experience.

AERS 105 AFROTC Leadership Lab
Credit 1. 2 Lab Hours.
Designed to give insight into the Air Force and give leadership opportunities to cadets through a variety of experiences; expected to perform a multitude of tasks in both the subordinate and superior roles.  
Must be taken on a satisfactory/unsatisfactory basis.

AERS 106 AFROTC Leadership Lab
Credit 1. 2 Lab Hours.
Designed to give insight into the Air Force and give leadership opportunities to cadets through a variety of experiences; expected to perform a multitude of tasks in both the subordinate and superior roles.  
Must be taken on a satisfactory/unsatisfactory basis.

AERS 201 Evolution of Air and Space Power
Credit 1. 1 Lecture Hour.
Examines general aspects of air and space power through a historical perspective; covers the time period from the first use of balloons to the Persian Gulf War; AFROTC cadets must register for Leadership Laboratory (AERS 105) as it complements this course with followership/leadership experience.

AERS 202 Evolution of Air and Space Power
Credit 1. 1 Lecture Hour.
Continuation of AERS 201; AFROTC cadets must register for Leadership Laboratory (AERS 106) as it complements this course with followership/leadership experience.

AERS 303 Air Force Leadership Studies
Credits 3. 3 Lecture Hours.
Leadership, management fundamentals, professional knowledge, Air Force personnel and evaluation systems, and leadership ethics; case studies of leadership and management situations as a means of demonstrating and exercising practical application of concepts; Air Force contract individuals (or those seeking a contract) must register for Leadership Lab (AERS 105).

AERS 304 Air Force Leadership Studies
Credits 3. 3 Lecture Hours.
Continuation of AERS 303; Air Force contract individuals (or those seeking a contract) must register for Leadership Lab (AERS 106).

AERS 403 National Security Affairs--Preparation for Active Duty
Credits 3. 3 Lecture Hours.
Examines the Constitution and the national security process; focuses on civilan control of the military; the roles of the Services; and the functions of the Air Force commands; AFROTC cadets must register for Leadership Laboratory (AERS 105) as it complements this course with followership experience.

AERS 404 National Security Affairs—Preparation for Active Duty
Credits 3. 3 Lecture Hours.
National Security Affairs--Preparation for Active Duty. Continuation of AERS 403; Air Force contract individuals (or those seeking a contract) must register for Leadership Lab (AERS 106).  
Prerequisite: Non-Air Force contract students must have approval of instructor and department head.
AFST - Africana Studies

Courses

AFST 201 Introduction to Africana Studies
Credits 3. 3 Lecture Hours.
Introduction to the field of Africana Studies: interdisciplinary approach drawing from history, philosophy, sociology, political studies, literature and performance studies; explores the African foundational relationship to and connections with its diaspora populations; covers Africa, the United States, the Caribbean, Europe and South America.

AFST 204/ENGL 204 Introduction to African-American Literature
Credits 3. 3 Lecture Hours.
Introduction to the writings of African Americans from the 18th century to the present, emphasizing the major themes and traditions.
Prerequisite: ENGL 104.
Cross Listing: ENGL 204/AFST 204.

AFST 205/ENGL 205 Introduction to Africana Literature
Credits 3. 3 Lecture Hours.
Works, literary movements and genres of authors of African descent in the Americas, Europe and Africa.
Prerequisite: ENGL 104.
Cross Listing: ENGL 205/AFST 205.

AFST 206/PSYC 206 Black Psychology
Credits 3. 3 Lecture Hours.
Critical examination of psychological experience, theories, and methods from perspectives grounded in the “Black experience.”
Cross Listing: PSYC 206/AFST 206.

AFST 208/PSYC 208 Stereotypes, Prejudice, and Minority Experience
Credits 3. 3 Lecture Hours.
Overview of theory and research relating to stereotyping, prejudice, discrimination, and minority experiences from a social psychological perspective.
Prerequisite: PSYC 107.
Cross Listing: PSYC 208/AFST 208.

AFST 209/PSYC 209 Psychology of Culture and Diversity
Credits 3. 3 Lecture Hours.
Introduction to various issues surrounding an increasingly interconnected and globalized world by critically examining the dynamic relationship between psychological processes and diverse (e.g., motivation, memory, self, prejudice) socio-cultural contexts.
Prerequisite: PSYC 107.
Cross Listing: PSYC 209/AFST 209.

AFST 252/PHIL 252 Introduction to Hip-Hop Philosophy
Credits 3. 3 Lecture Hours.
Introduction to philosophy by way of the major themes and subjects of Hip-Hop; critical advocacy of various philosophical ideals.
Cross Listing: PHIL 252/AFST 252.

AFST 285 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Directed studies in the field of africana studies. May be taken two times for credit.
Prerequisite: Freshman or sophomore classification; approval of instructor and director.

AFST 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Special Topics in... Selected topics in Africana Studies. May be repeated for credit.

AFST 291 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the direction of a faculty member in Africana Studies. May be taken three times for credit.
Prerequisites: 6 credits of AFST; freshman or sophomore classification and approval of instructor.

AFST 300/HIST 300 Blacks in the United States, 1607-1877
Credits 3. 3 Lecture Hours.
Blacks in the United States from the colonial period to 1877; the slave trade, slavery, free blacks and the impact of the Civil War and Reconstruction on blacks.
Prerequisite: Junior or senior classification.
Cross Listing: HIST 300/AFST 300.

AFST 301/HIST 301 Blacks in the United States Since 1877
Credits 3. 3 Lecture Hours.
Blacks in the United States from the end of Reconstruction to the present; ideologies of black leaders, disfranchisement, lynching and the quest for equality in the 1950s and 1960s.
Prerequisite: Junior or senior classification.
Cross Listing: HIST 301/AFST 301.

AFST 302 Gateway Course
Credits 3. 3 Lecture Hours.
Gateway to a series of courses offered for the minor in Africana Studies: explores topics such as Afrocentrism, postcolonial studies, black cultural studies, black feminist theory for a close study of issues among African and African diaspora populations in Africa, the United States, Caribbean, Europe and South America.

AFST 303 Psychology of Women of Color
Credits 3. 3 Lecture Hours.
Interdisciplinary theories to study the unique yet intersectional experiences of women from different racial groups, ethnicities, nationalities and cultural backgrounds; scholarly research from the diversity science field; contemporary topics that have developed in a global context; examination of complex issues, which affect women of color across the lifespan.
Prerequisite: Grade of C or better in AFST 201 or PSYC 107 or WGST 200, or approval of instructor.
Cross Listing: PSYC 303 and WGST 303.

AFST 317/SOCI 317 Racial and Ethnic Relations
Credits 3. 3 Lecture Hours.
Status of racial and ethnic groups such as Native Americans, African Americans, Latino Americans, Asian Americans, European Americans, and other groups in the political, economic, legal and social systems of the United States.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: SOCI 317/AFST 317.
AFST 323/SOCI 323 Sociology of African Americans
Credits 3. 3 Lecture Hours.
Major elements of the Afro-American subculture in relation to white
American society and its major social institutions.
Prerequisites: SOCI 205; junior or senior classification or approval of
instructor.
Cross Listing: SOCI 323/AFST 323.

AFST 324 Africana Social Sciences
Credits 3. 3 Lecture Hours.
Exploration of a significant topic pertaining to Africa and/or its diaspora in
the social sciences.
Prerequisite: Junior or senior classification.

AFST 325 Africana Humanities
Credits 3. 3 Lecture Hours.
Exploration of a significant topic pertaining to Africa and/or its Diaspora in
the humanities and arts.
Prerequisite: Junior or senior classification.

AFST 326 Africana Popular Culture
Credits 3. 3 Lecture Hours.
Dynamics of popular culture and classic theories of society; popular and
public cultural forms in context of globalization and the Africana Diaspora.
Prerequisite: Junior or senior classification or approval of instructor.

AFST 327 Popular Musics in the African Diaspora
Credits 3. 3 Lecture Hours.
Examination of a range of popular musics from the twentieth century that
have emerged in conjunction with the historical global spread of peoples
and cultures from the African continent; technical knowledge about music
is not required; focus on social and cultural contexts for popular music.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: PERF 327 and MUSC 327.

AFST 329/ENGL 329 African-American Literature Pre-1930
Credits 3. 3 Lecture Hours.
Major works of the African-American literary tradition from the 18th century
to 1930 studied within cultural and historical context.
Prerequisites: 3 credits of literature at 200-level or above.
Cross Listing: ENGL 329/AFST 329.

AFST 339/ENGL 339 African-American Literature Post-1930
Credits 3. 3 Lecture Hours.
Major works of the African-American literary tradition from the 1930s to the
present studied in their cultural and historical context.
Prerequisites: 3 credits of literature at 200-level or above.
Cross Listing: ENGL 339/AFST 339.

AFST 344/HIST 344 History of Africa to 1800
Credits 3. 3 Lecture Hours.
Origins of humankind in Africa; development and spread of pastoralism,
agriculture and iron-working; formation of states and empires; impact of
Christianity and Islam; rise of international trade in gold, ivory and slaves;
African diaspora.
Prerequisite: Junior or senior classification.
Cross Listing: HIST 344/AFST 344.

AFST 345/HIST 345 Modern Africa
Credits 3. 3 Lecture Hours.
Survey of Africa since 1800; pre-colonial African states and societies;
establishment and impact of European colonial rule; rise of nationalist
movements; achievement of independence; problems of political stability
and economic development in contemporary Africa; South Africa's
apartheid regime and its opponents.
Prerequisite: Junior or senior classification.
Cross Listing: HIST 345/AFST 345.

AFST 346/HIST 346 History of South Africa
Credits 3. 3 Lecture Hours.
Selected themes in the history of South Africa from the African Iron Age
to the Apartheid regime; history of race relations in the 19th and 20th
centuries and the rise of modern industrial state.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: HIST 346/AFST 346.

AFST 352/PHIL 352 Africana Philosophy
Credits 3. 3 Lecture Hours.
Presentation of the seminal ideas of several influential Africana thinkers;
recovery of the neglected traditions in which these thinkers locate
themselves.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: PHIL 352/AFST 352.

AFST 353/PHIL 353 Radical Black Philosophies of Race and Racism
Credits 3. 3 Lecture Hours.
Critical evaluation of white supremacy, colonialism and the modern
construction of race; examination of the historical background for
contemporary theories of race.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: PHIL 353/AFST 353.

AFST 357/HIST 357 Out of Africa: The Black Diaspora and the Modern
World
Credits 3. 3 Lecture Hours.
History and cultures of the peoples of the African Diaspora from the
fourteenth through the nineteenth centuries; social, political, and economic
impact on Africa, the Americas, Europe, and the Arab World; emphasis on
race, gender, identity, and migration.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: HIST 357/AFST 357.

AFST 362/HIST 302 Women and War in the African Diaspora
Credits 3. 3 Lecture Hours.
Case studies of women and war in the African diaspora in a wide historical
and comparative context; social, economic, and cultural influence of war
on women's lives; women as victims, combatants, and refugees; historical
construction of race, ethnic and gender identity during times of conflict.
Prerequisite: Junior or senior classification.
Cross Listing: HIST 302.

AFST 379/ENGL 379 Postcolonial Literatures
Credits 3. 3 Lecture Hours.
Exploration of key terms, themes and debates within global literature
written by colonized, occupied and diasporic peoples.
Prerequisites: 3 credits of literature at the 200-level or above.
Cross Listing: ENGL 379/AFST 379.
AFST 391 Africana Feminisms
Credits 3. 3 Lecture Hours.
Exploration of a significant topic in feminism by and about women from Africa and/or its Diaspora, from various disciplinary perspectives and historical periods, and with application to societal debates and controversies.
Prerequisite: Junior or senior classification.

AFST 393/ENGL 393 Studies in Africana Literature and Culture
Credits 3. 3 Lecture Hours.
Literary movements, genres, groups of authors, topics or issues in the literature and culture of people in African descent.
Prerequisites: 3 credits of literature at 200-level or above; junior or senior classification or approval of instructor.
Cross Listing: ENGL 393/AFST 393.

AFST 401 Slavery in World History
Credits 3. 3 Lecture Hours.
Comparative history of human slavery; slavery in the Ancient World, Asia, Africa; varieties of modern slavery in the New World since 1500; abolition of slavery and continuing forms of human bondage in the contemporary world.
Prerequisite: Junior or senior classification.
Cross Listing: ASIA 401 and HIST 401.

AFST 425/COMM 425 Rhetoric of the Civil Rights Movement
Credits 3. 3 Lecture Hours.
Rhetorical evaluation of theoretical literature and pragmatic episodes that shaped the U.S. Civil Rights Movement; examination of significant speeches, documents, and protest activities in their historical, political, and social contexts.
Prerequisite: Junior or senior classification.
Cross Listing: COMM 425/AFST 425.

AFST 481 Seminar
Credits 3. 3 Lecture Hours.
Comparative studies of slave societies in the modern world; history and analysis of African American feminism; comparative analyses of the social, political, and economic condition of African Americans and other African peoples of the diaspora.
Prerequisite: AFST 302; junior or senior classification.

AFST 485 Directed Studies
Credits 0 to 3. 0 to 3 Other Hours.
Selected fields of Africana Studies not covered in depth by other courses. Reports and extensive reading required. May be repeated for credit.
Prerequisite: Approval of director of Africana Studies.

AFST 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Special Topics in... Selected topics in Africana Studies. May be repeated for credit.

AFST 491 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the direction of a faculty member in Africana Studies. May be repeated 3 times for credit.
Prerequisites: 6 credits of AFST; junior or senior classification and approval of instructor.

AFST 601 Methods of Inquiry Into Africana Studies
Credits 3. 3 Lecture Hours.
Familiarization with the methodological tradition of African-centered thinking and its relationship to the more popular term Afro-centricity; representation of the thoughts of notable African centered and Afrocentric scholars throughout history as a means to center African descended people throughout history, social analysis and theoretical accounts.
Prerequisite: Graduate classification.

AFST 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed individual study of problems in the Africana Studies field of research or scholarly activity not pertaining to thesis or dissertation, or selected instruction not covered by other courses.
Prerequisites: Approval of instructor and program director; graduate classification.

AFST 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of Africana Studies.
Prerequisite: Graduate classification.

AGCJ - Ag Comm & Journalism

Courses

AGCJ 105 Introduction to Agricultural Communications
Credits 3. 3 Lecture Hours.
Introduction to mass communication, its history, role in society, and especially its unique role in agriculture; importance of mass communication and the communication methods used in modern society; foundation for an understanding of agricultural news and information; credit cannot be given for both AGCJ 105 and JOUR 102.

AGCJ 281 Journalism Concepts for Agriculture
Credits 3. 3 Lecture Hours.
The role of the news media in covering government, the court systems, corporations, taxation, and insurance; a practical perspective on how journalists interact with public and private institutions from a legal, ethical and social standpoint.
Prerequisite: AGCJ 105 or co-enrollment in AGCJ 105.

AGCJ 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed study of selected issue in field of agricultural communications with emphasis on collection, synthesis and interpretation of information.
Prerequisite: Approval of department advisor.

AGCJ 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Special topics in an identified area of agricultural development. May be repeated for credit.
Prerequisite: Approval of department advisor.

AGCJ 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in agricultural communications and journalism. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of department advisor.
AGCJ 305 Theory and Practice of Agricultural Publishing
Credits 3. 3 Lecture Hours.
Audience identification, publication content, management and design; analyze existing agricultural publications, identify audiences, advertising base and content; credit cannot be given for both AGCJ 305 and JOUR 321.
Prerequisites: AGCJ 105; junior or senior classification.

AGCJ 306 Theory and Practice of Agricultural Public Relations
Credits 3. 3 Lecture Hours.
Public relations between agricultural producers and their suppliers as a critical part of agricultural communication; public relations objectives, strategies, tactics, evaluation and execution theory and practice examined; credit cannot be given for both AGCJ 306 and JOUR 324.
Prerequisites: AGCJ 105; junior or senior classification.

AGCJ 307 Design for Agricultural Media
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Principles and practices of agricultural media design, including design and production of printed publications and graphics; computer assisted design and production of media pieces. Required for AGCJ majors and minors.
Prerequisite: Junior or senior classification.

AGCJ 308 Agricultural Photography
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Develop knowledge of photography, editing software, and composition techniques used in the agricultural communications field; develop photography and photo editing skills to a satisfactory level as demonstrated by performance on assignments and exams.
Prerequisite: Junior or senior classification.

AGCJ 312 Editing for Agricultural Audiences
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Principles and practices of editing for agricultural and technical audiences including improving and tightening copy; writing headlines, titles, and subheads; photo editing and captions, graphics and layout; print, broadcast, Interactive and other media; credit cannot be given for both AGCJ 304 and JOUR 304.
Prerequisites: AGCJ 105; junior or senior classification.

AGCJ 314 Agricultural Media Writing I
Credits 3. 2 Lecture Hours. 2 Lab Hours.
News gathering, writing, editing and ethics for current and emerging mediums used in agricultural communication; includes news identification, basic news writing methods, introduction to public relations, broadcast and Internet writing, interviewing skills, proper use of direct quotes and other news style, credit cannot be given for both AGCJ 312 and JOUR 203.
Prerequisite: Grade of C or better in AGCJ 105 and AGCJ 313.

AGCJ 314 Agricultural Media Writing II
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Interpretive agricultural news gathering and writing for all media types; basic media law and ethics, interviewing skills with assigned practice writing about agriculture, and science and technology, including meeting and event coverage both on and off campus; print, broadcast, Interactive and other media; credit cannot be given for both AGCJ 314 and JOUR 303. Grade of C or better in AGCJ 312; junior or senior classification.

AGCJ 366 Radio Broadcasting
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Survey of American broadcasting, development, and impact; influence on society, basic principles, mass communication theory, station operating programming, advertising, rating services, regulation, and censorship; in-depth analysis of current issues and developments.
Prerequisite: Junior or senior classification.

AGCJ 380 Workshop in Agricultural Communications and Journalism
Credits 1 to 4. 1 to 4 Lecture Hours.
The study, understanding and solution of human-agricultural problems based on theory learned in the classroom, library, laboratory and fieldwork completed by individuals and teams.
Prerequisite: Junior or senior classification.

AGCJ 404 Communicating Agricultural Information to the Public
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Use of agricultural journalism principles and techniques to communicate scientific information related to agriculture, agribusiness, natural resources and life sciences to the general public; communication processes include audience identification, writing, editing and production of agricultural science-based manuscripts for popular and refereed publications.
Prerequisite: Junior or senior classification.

AGCJ 405 Agricultural Publications Production
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Study and practice of the principles and concepts of designing, writing, editing, producing and distributing the AgriLeader magazine and Web site; includes practical applications of writing feature articles, magazine and Web site design, advertising sales, layout and graphics. May be repeated one time for credit.
Prerequisites: AGCJ 312, AGCJ 305; approval of instructor; junior or senior classification.

AGCJ 406 Agricultural Public Relations Methods
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Agricultural public relations campaign analysis; public relations case studies and methods including writing public relations plans for agricultural entities, producing public relations components and evaluating public relations objectives, strategies and tactics.
Prerequisites: AGCJ 306; junior or senior classification.

AGCJ 407 Web Authoring in Agricultural Communication
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Study and practice of basic Web site design theories, principles and writing for the Web; use of Web authoring software (not a programming class) to create online publications tailored for agricultural audiences; emphasizes informative content and functional design.
Prerequisites: AGCJ 307; junior or senior classification.

AGCJ 409 Television Production for Agricultural Journalists
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Fundamental concepts required to develop a broadcast quality video production; uses the high definition facilities of KAMU-TV and TTVN; hands-on experience in video production including producing, shooting and hosting a professional program series broadcast on KAMU-TV.
Prerequisite: Junior or senior classification.

AGCJ 466 Advanced Radio Broadcasting. (2-2). Credit 3
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Project-based instruction; a practical guide to producing, presenting, programming and managing a radio station.
Prerequisites: AGCJ 366; junior or senior classification or approval of instructor.

AGCJ 481 Senior Seminar
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Identification of communication-related issues; strategic planning to meet goals; measurable communication outcomes; writing, designing, creating and distributing communications products to clients; measuring effectiveness; working in teams.
Prerequisites: Grade of C or better in AGCJ 313; senior classification.
AGCJ 485 Directed Studies
Credits 1 to 4. 1 to 4 Lecture Hours.
Directed individual study of selected problems in agricultural communications, communication methods and the communication profession with emphasis on collection, analysis and presentation of information.
Prerequisites: Junior or senior classification; approval of department advisor.

AGCJ 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 1 to 4 Lab Hours.
Special topics in an identified area of agricultural communications and journalism. May be repeated for credit.
Prerequisite: Junior or senior classification.

AGCJ 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in agricultural communications and journalism. May be repeated 3 times for credit.
Prerequisites: Junior or senior classification and approval of department advisor.

AGCJ 494 Internship
Credits 1 to 6. 1 to 6 Other Hours.
Supervised internship and independent study related to the student's professional interest.
Prerequisites: Junior or senior classification; approval of department advisor.

AGEC - Agricultural Economics

Courses

AGEC 105 Introduction to Agricultural Economics
Credits 3. 3 Lecture Hours.
(AGRI 2317) Introduction to Agricultural Economics. Characteristics of our economic system and basic economic concepts; survey of the farm and ranch firm and its organization and management; structure and operation of the marketing system; functional and institutional aspects of agricultural finance; government farm programs.

AGEC 217 Fundamentals of Agricultural Economics Analysis
Credits 3. 3 Lecture Hour. 4 Lab Hours.
Relates contemporary agribusiness issues to economic and financial management, illustrating their integration toward pragmatic applications in the agricultural industry; lab focuses on the integration of mathematics and economics with computer skills directed toward spreadsheets, databases, web pages, and communications software; emphasis is on writing as a critical communication skill.
Prerequisites: AGEC 105; ENGL 103 or 104; MATH 141; MATH 142; and sophomore or junior agricultural economics or agribusiness majors; or approval of department head.

AGEC 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed study of selected problems in agricultural economics.
Prerequisites: AGEC 105; freshman or sophomore classification in agricultural economics, agribusiness, or approval of instructor and department head; 2.5 GPR in major, overall, and CBK courses, if applicable; see an academic advisor in Room 214 AGLS.

AGEC 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of agricultural economics. May be repeated for credit.
Prerequisites: Freshman or sophomore classification and approval of department head.

AGEC 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in agricultural economics. May be repeated 3 times for credit.
Prerequisites: Freshman or sophomore classification and approval of department head; see an academic advisor in Room 214 AGLS.

AGEC 314 Marketing Agricultural and Food Products
Credits 3. 3 Lecture Hours.
Operations involved in movement of agricultural commodities from farmer to consumer via several intermediaries; functions involve buying, selling, transportation, storage, financing, grading, pricing and risk bearing; agricultural supply chain or value chain is studied in detail; marketing aspects of commodities and differentiated goods.
Prerequisites: AGEC 105 or 3 hours of economics; and junior or senior classification.

AGEC 315 Food and Agricultural Sales
Credits 3. 3 Lecture Hours.
Principles of professional sales techniques used in food and agricultural firms; develop a professional sales presentation; study current agribusiness industry professional salespersons.
Prerequisite: Junior or senior classification.

AGEC 317 Economic Analysis for Agribusiness Management
Credits 3. 3 Lecture Hours.
Quantitative methods used to address managerial problems, specifically calculus-based optimization, marginal analysis, statistical and forecasting techniques, linear programming, and risk analysis; emphasis on theoretical aspects and applied analysis of managerial problems faced by agricultural firms.
Prerequisites: AGEC 217; ECON 322 or ECON 323; SCMT 303 or STAT 301 or STAT 302 or STAT 303; and junior or senior classification; agricultural economics, agribusiness majors only; or approval of department head.

AGEC 325 Principles of Farm and Ranch Management
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Agribusiness managerial decision making and analysis in different market environments; emphasis is on profit maximization; lab focuses on using computerized methods for evaluating management alternatives for farming and ranching problem situations.
Prerequisites: AGEC 105 or ECON 202; junior or senior non-agricultural economics, nonagribusiness majors only; and knowledge of Excel.

AGEC 330 Financial Management in Agriculture
Credits 3. 3 Lecture Hours.
Principles of financial management of farms, ranches, and other agribusiness firms; financial statements, financial statement analysis, time value of money, investment analysis, firm growth, risk management, credit analysis and best business management practices.
Prerequisites: AGEC 105 or 3 hours of economics; ACCT 209 or ACCT 229; and junior or senior classification.
AGEC 340 Agribusiness Management
Credits 3. 3 Lecture Hours.
Survey of management practices throughout the food marketing chain; focuses on farm and ranch suppliers, farmers and ranchers, first handlers, food processors, food distributors, and restaurants, food retailers and institutions; use of case studies and models for the purpose of evaluating firm management success.
Prerequisites: AGEC 105 or 3 hours of economics; and junior or senior classification.

AGEC 344 Food and Agricultural Law
Credits 3. 3 Lecture Hours.
Legal principles relevant to the farm family and business; characteristics of legal decisions and rules on property rights, and fencing laws; analysis of global, national, state, and local legal issues in contracts, torts, water, pollution, and natural resources.
Prerequisite: Junior or senior classification.

AGEC 350 Environmental and Natural Resource Economics
Credits 3. 3 Lecture Hours.
Inspection of issues such as environmental degradation, population growth, recycling, water use and depletion, natural habitat protection, water and air pollution, acid deposition, fishery management, and global warming using economically derived principles and tools.
Prerequisite: Junior or senior classification.

AGEC 401 Global Agri-Industries and Markets: Study Abroad
Credits 3. 3 Lecture Hours.
Understanding agriindustries and markets; analysis of production; importing, exporting; provides classroom experience with an exposure to a variety of global cultures in an international setting. Course may be repeated 3 times for credit.
Prerequisites: AGEC 105 or 3 hours of economics; junior or senior classification or approval of department head.

AGEC 402 Survey of International Agricultural Economics: Study Abroad
Credits 3. 3 Lecture Hours.
Examine, from an international setting, the shape of international agriculture; how culture, history, politics and geography in foreign countries affect the production and management of agricultural products; agricultural policy formation; countries' natural resources and competitive strategies; may be taken 3 times for credit.
Prerequisites: AGEC 105 or 3 hours of economics; junior or senior classification or approval of department head.

AGEC 413 Agricultural Cooperatives
Credits 3. 3 Lecture Hours.
Historical development and principles of cooperative associations in our economic system; organizational and operational aspects of cooperatives; legal considerations, financing, management, and member relations; and future role of cooperatives.
Prerequisites: AGEC 105; AGEC 314; and junior or senior classification.

AGEC 414 Agribusiness and Food Market Analysis
Credits 3. 3 Lecture Hours.
Application of economic and marketing principles to contemporary food and agribusiness marketing; practical marketing management for agribusiness firms; market analysis; and marketing strategy and planning as related to the emerging trends in the global food and agribusiness sector of the economy.
Prerequisites: AGEC 317; FINC 341; MKTG 321; and junior or senior agribusiness majors only.

AGEC 415 Food and Agribusiness Strategic Market Planning
Credits 3. 3 Lecture Hours.
Development of a market plan targeting the food and agribusiness market sector; market analysis; business propositions; action plans for executing the 4 P's (Product, Price, Place, Promotion); monitoring and measurement.
Prerequisites: AGEC 314 or MKTG 321 or MKTG 409; AGEC 315; junior or senior classification or approval of instructor.

AGEC 422 Land Economics
Credits 3. 3 Lecture Hours.
Economic, institutional, and physical factors involved in the use and control of natural resources; includes elements of introductory land economics as a discipline, economic foundations of land economics, institutional influences on land use, and the effects of public policy on land use.
Prerequisites: AGEC 105 or 3 hours economics; and junior or senior classification.

AGEC 424 Rural Entrepreneurship I
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Strategic planning regarding economic feasibility of a single-enterprise rural or metropolitan business venture; emphasis on processes for developing a comprehensive enterprise budget and construction and evaluation of risk management alternatives; exchanges with "real-world" entrepreneurs, financial experts and other management personnel; computer capabilities essential.
Prerequisites: AGEC 105 or ECON 202; ACCT 209 or ACCT 210 or ACCT 229 or ACCT 230 or AGEC 325 or AGEC 330 or FINC 341 or FINC 409; junior or senior classification; or approval of department head.

AGEC 425 Rural Entrepreneurship II
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Strategic planning regarding economic feasibility of a single-enterprise rural or metropolitan business venture; emphasis on processes for developing comprehensive economic and financial prospectuses, including enterprise budgets, risk management planning, cash flow budgeting, net worth statements, income budgets, reconciliation statements and shock analysis; mentoring exchanges with "real-world entrepreneurs, financial experts and other management personnel.
Prerequisites: AGEC 424; and junior or senior classification.

AGEC 429 Agricultural Policy
Credits 3. 3 Lecture Hours.
Analysis of the causes, nature, and effects of government participation in agriculture; and interrelationship of the American agriculture and agribusiness sector with the political and economic system, public administration, and interest group representation.
Prerequisites: AGEC 105, ECON 202 or ECON 203; ENGL 103 or ENGL 104; and junior or senior classification.

AGEC 430 Macroeconomics of Agriculture
Credits 3. 3 Lecture Hours.
Basic functioning of U.S. economy and relationship to agriculture; the differential effects of macroeconomic policy on disposable income, interest rates, unemployment, inflation and exchange rates; impact on agricultural commodity prices, farm input costs, net farm income, farmland values and key financial indicators.
Prerequisites: AGEC 105 or 3 hours of economics; AGEC 317 or concurrent enrollment; AGEC 429; AGEC 330 or FINC 341 or FINC 409; and junior or senior classification.
AGEC 431 Cases in Agribusiness Finance
Credits 3.3 Lecture Hours.
Financial management of agribusiness firms; advanced topics in financial statement analysis, liquidity management, investment analysis, and capital structure illustrated through examination of agribusiness cases.
Prerequisites: AGEC 317; AGEC 340; FINC 341; and junior or senior agribusiness majors only.

AGEC 432 Rural Real Estate and Financial Analysis
Credits 3.3 Lecture Hours.
Advanced topics in investment analysis; financial intermediation in agriculture; real estate markets and market analysis; and appraisal valuation.
Prerequisites: AGEC 317 (waived for nonmajors); AGEC 330 or FINC 341 or FINC 409; AGEC 422; ACCT 210 or ACCT 230; and junior or senior classification.

AGEC 433 Rural Financial Markets and Financial Planning
Credits 3.3 Lecture Hours.
Organization, structure, conduct and regulation of lending institutions serving commercial agriculture and rural borrowers; borrower financial statement analysis, business forecasting, investment analysis and loan application process; lender credit application underwriting standards, credit scoring and loan decision making process; agricultural loan portfolio analysis.
Prerequisites: ACCT 209 or ACCT 229; ACCT 210 or ACCT 230; AGEC 330 or FINC 341 or FINC 409; junior or senior classification.

AGEC 434 Financial Planning for Professionals
Credits 3.3 Lecture Hours.
Financial planning from a professional perspective; applying basic financial, economic and institutional concepts to advise individuals, families and small businesses in achieving their financial goals; tools and topics include financial analysis, budgeting, credit management, time value of money, investment strategies, income taxes, risk management, and retirement and estate planning.
Prerequisites: AGEC 330, FINC 409 or FINC 341; junior or senior classification.

AGEC 435 Insurance and Estate Planning
Credits 3.3 Lecture Hours.
Insurance and estate planning for individuals, families and small businesses; applies risk management principles to evaluate various insurance products, including life, disability, long-term care, health, homeowners, auto and liability; estate planning process, tools and considerations.
Prerequisites: AGEC 330, AGEC 435, FINC 409 or FINC 341; junior or senior classification.

AGEC 436 Tax Planning
Credits 3.3 Lecture Hours.
 Applies the principles of income, gift and estate tax planning to enhance household income after taxes; understanding tax laws, reporting requirements and opportunities for planning; identify and implement useful tax planning strategies; focus on practical application for financial planning.
Prerequisites: AGEC 330, AGEC 435, FINC 409 or FINC 341; junior or senior classification.

AGEC 437 Tax Planning
Credits 3.3 Lecture Hours.
Applying investment principles considering families’ goals, time horizons, risk tolerance and tax implications to build investment portfolios; attributes of various asset classes; asset allocation, selecting securities and portfolio management; developing successful investment programs for personal investors and financial planners.
Prerequisites: AGEC 435 and junior or senior classification.

AGEC 438 Investment Planning
Credits 3.3 Lecture Hours.
Strategic management and economic principles for the agribusiness system; problem recognition and applied managerial/economic decision making with related considerations in marketing, production, or finance for agribusiness firms.
Prerequisites: AGEC 317; AGEC 340; FINC 341; MGMT 363; MKTG 321; and junior or senior agribusiness majors only.

AGEC 439 Retirement Planning
Credits 3.3 Lecture Hours.
Retirement planning basics, qualified and nonqualified retirement plans, Social Security provisions and government healthcare plans along with the basics of employee benefits; focus on both quantitative (i.e., calculating retirement needs and plan limits) and qualitative (i.e., retirement age decisions, retirement income management) aspects of retirement.
Prerequisite: AGEC 435 and junior or senior classification.

AGEC 440 Agribusiness Strategic Analysis
Credits 3.3 Lecture Hours.
Applying investment principles considering families’ goals, time horizons, risk tolerance and tax implications to build investment portfolios; attributes of various asset classes; asset allocation, selecting securities and portfolio management; developing successful investment programs for personal investors and financial planners.
Prerequisites: AGEC 435 and junior or senior classification.

AGEC 441 Financial Planning Capstone
Credits 3.3 Lecture Hours.
Factors influencing the level of food and agricultural prices; price trends and seasonal variation; methods of forecasting demands and prices; and futures trading.
Prerequisites: AGEC 314; AGEC 317; and junior or senior classification.

AGEC 442 Agricultural Commodity Futures
Credits 3.3 Lecture Hours.
Activities of commodity futures exchanges; the mechanics of trading futures contracts; the use of futures trading for hedging and forward pricing; and options, basis behavior, and hedging strategies for selected commodities.
Prerequisites: AGEC 105 or 3 hours of economics; AGEC 314; AGEC 317 or concurrent enrollment; and junior or senior classification; or approval of department head.

AGEC 443 International Trade and Agriculture
Credits 3.3 Lecture Hours.
Changing role of U.S. agriculture in a dynamic world economy; national and international policies and institutions affecting agriculture; and exchange rates, tariffs, and non-tariff barriers.
Prerequisites: AGEC 105 or 3 hours of economics; and junior or senior classification.
AGEC 453 International Agribusiness Marketing
Credits 3. 3 Lecture Hours.
Basic competencies in international marketing of agri-foods; and market entry, pricing, payment, finance, and promotion.
Prerequisites: AGEC 105 or 3 hours of economics; and junior or senior classification.

AGEC 460 Cross-Cutting Issues in Agricultural Economics
Credits 3. 3 Lecture Hours.
Examination of economic theory and its history; emphasis on the areas of agricultural business, finance, macroeconomics, management, marketing, microeconomics, quantitative analysis, resources, and economics policy; emphasis on the ability to properly analyze economic problems.
Prerequisites: AGEC 317; AGEC 314 or MKTG 321 or MKTG 409; AGEC 330 or FINC 341 or FINC 409; AGEC 429; agricultural economics and agribusiness majors only; junior or senior classification or approval of instructor.

AGEC 481 Ethics in Agribusiness and Agricultural Economics
Credit 1. 1 Lecture Hour.
Examination of the principals of ethical business behavior; context created through assigned readings, guest speakers from various law enforcement branches and private industry; student written reports about their own experiences relative to this context; attention given to establishing personal principles for an ethical business career.
Prerequisites: AGEC 217; junior or senior classification; and agricultural economics or agribusiness majors only.

AGEC 484 Internship
Credits 1 to 6. 1 to 6 Other Hours.
Supervised experience program conducted in the area of the student's interest in agricultural economics and agribusiness. May be taken two times.
Prerequisite: See an advisor in Room 214 AGLS Building.

AGEC 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Special problems not covered by other courses. Content will depend upon problem studied.
Prerequisite: See an advisor in Room 214 AGLS Building.

AGEC 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of agricultural economics. May be repeated for credit.
Prerequisite: Junior or senior classification.

AGEC 491 Research
Credits 1 to 6. 1 to 6 Other Hours.
Research conducted under the direction of faculty member in agricultural economics. May be repeated 3 times for credit. Registration in multiple sections of this course are possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of department head; see an advisor in Room 214 AGLS Building.

AGEC 601 Commodity Futures and Options Markets
Credits 3. 3 Lecture Hours.
Price risk management using agricultural commodity futures and options markets, theories of hedging and formulation of optimal hedging strategies, applied hedging strategies evaluated with emphasis on options relative to futures.
Prerequisites: One course in calculus and one course in statistics.

AGEC 603 Land Economics
Credits 3. 3 Lecture Hours.
Application of economic, financial, legal and related concepts and tools for decision making in land management, real estate development and appraisal of land and attendant resources; public and private property rights and current land and resource management issues emphasized; real estate valuation methods and use of electronic information systems studied.
Prerequisite: AGEC 422 or equivalent.

AGEC 604/PSAA 663 Natural Resource Economics
Credits 3. 3 Lecture Hours.
Critical evaluation of policies and procedures in natural resource development and use; identification of problems in resource development, the political-economic decision-making processes and analytical tools which can contribute to economic decisions.
Prerequisite: ECON 323.
Cross Listing: PSAA 663/AGEC 604.

AGEC 605 Rural Real Estate Appraisal and Organization
Credits 3. 3 Lecture Hours.
Concepts of property rights and their valuation; factors affecting the value of these rights are related to general economic theory to explain real estate market process; specific applications of appraisal techniques in valuing urban and rural real properties.
Prerequisite: AGEC 422.

AGEC 606 Water Resource Economics
Credits 3. 3 Lecture Hours.
Examination of economic concepts and tools contributing to the solution of water scarcity problems; development of working knowledge of water resource economics; policy options established and explored; analytical tools for performing policy and project assessment introduced and applied.
Prerequisite: MATH 142.

AGEC 607 Research Methodology
Credits 3. 3 Lecture Hours.
Scientific method in economic research: problem identification and selection, hypothesis testing, assumptions, model selection, data communication; evaluation of research studies and development of thesis prospectus or equivalent.
Prerequisite: MS or PhD graduate classification.

AGEC 610 Economics of Biosecurity
Credits 3. 3 Lecture Hours.
Economic and policy issues involved with decision making under risk of accidental or deliberate events of agricultural threats involved with animal diseases, food contamination, invasive species, infrastructure disruption, etc.; issues regarding assessments of damages, vulnerability and decision making regarding prevention, detection, response, and recovery.
Prerequisite: Graduate classification.

AGEC 614 Global Food and Agribusiness Policy
Credits 3. 3 Lecture Hours.
Public policies and programs affecting agriculture and agribusiness; development of policies and programs, identifying relevant issues, reviewing means to attain desired goals, and development of methods to evaluate the consequences of alternative farm policies on U.S. agriculture, agribusiness, trade and resources.
Prerequisites: AGEC 619 or ECON 607 and MATH 142.
Course Descriptions

AGEC 619 Managerial Economics in Agribusiness
Credits 3. 3 Lecture Hours.
Practical application of operational and strategic decision-making tools to agribusiness, focusing on important managerial and economic principles and understanding needed to carry out these functions.
Prerequisites: ECON 323, MATH 142 and STAT 303.

AGEC 621 Econometrics for Agribusiness
Credits 3. 3 Lecture Hours.
Econometric application and practice; analysis and interpretation of economic data for decision making and microcomputer implementation.
Prerequisites: MATH 142; STAT 303.
corequisite: ECON 323; ECON 311 or AGEC 430.

AGEC 622 Agribusiness Analysis and Forecasting
Credits 3. 3 Lecture Hours.
Design, construction, use and evaluation of simulation, forecasting and optimization models to solve applied problems confronting decision makers in agribusiness.
Prerequisite: AGEC 621 or approval of instructor.

AGEC 625 Environment of Agribusiness
Credits 3. 3 Lecture Hours.
Analysis of the economic, social, political, technological and legal forces that impact the way in which global agribusiness firms compete; emphasis on intensive case study analysis.
Prerequisites: AGEC 619 and AGEC 621.

AGEC 629 Strategic Agribusiness Management
Credits 3. 3 Lecture Hours.
Practical application of operational and strategic decision-making tools to agribusiness; emphasis on problem recognition and economic analysis related to production, marketing and finance decisions facing agribusiness firms.
Prerequisites: AGEC 619, AGEC 621 and AGEC 625.

AGEC 630 Financial Analysis for Agribusiness Firms
Credits 3. 3 Lecture Hours.
Application of financial planning and analysis to agribusiness firms; capital budgeting and selection of investments; the role of debt structure and liquidity in firm growth and stability; alternatives for gaining control over financial resources, managing risk and maintaining business efficiency over time.
Prerequisites: ACCT 640 and FINC 635.

AGEC 633 Sustainability in World Development
Credits 3. 3 Lecture Hours.
Economic development defined; economic structure, economic efficiency, equity, conservation and role of sustainability, characteristics of developing countries; problems facing development planners, policy makers, resource managers; role of local, regional and international institutions, policies, civil society, biodiversity, and climate change; economic foundation of project development, design, financing, and implementation issues.
Prerequisites: ECON 607 or equivalent.

AGEC 634 Rural Financial Markets and Financial Planning
Credits 3. 3 Lecture Hours.
Organization, structure, conduct, and regulation of lending institutions serving commercial agriculture and rural borrowers; financial statement analysis; cash management; investment planning; loan portfolio analysis; management of the lending function of lenders serving rural businesses.
Prerequisite: Graduate classification.

AGEC 635 Consumer Demand Analysis for Food and Agricultural Products
Credits 3. 3 Lecture Hours.
Analytical and empirical treatments of consumer behavior; use of neoclassical theory and modern adaptations in consumer demand analysis; specification, estimation, interpretation and evaluation of models of consumer behavior with emphasis on food commodities.
Prerequisites: ECMT 676, ECON 629 and AGEC 661.

AGEC 636 Agribusiness Markets and Applied Welfare Analysis
Credits 3. 3 Lecture Hours.
Theory and practice of consumer and firm behavior in markets; the effects of various policies on markets; welfare measurement applied to problems related to the farm economy; food and resource processing; resource allocations decisions.
Prerequisites: AGEC 635 and 661; ECMT 676; ECON 629 and ECON 630.

AGEC 637 Production Economics and Dynamic Optimization in Agricultural Economics
Credits 3. 3 Lecture Hours.
Production under certainty and uncertainty with emphasis on agribusiness firm behavior; economic theory and analytical and numerical methods related to dynamic optimization problems.
Prerequisites: AGEC 661; ECMT 675; ECON 629 and ECON 630.

AGEC 638 Managerial Economics for Regulatory Science
Credits 3. 3 Lecture Hours.
Economic and business frameworks within which the regulations and standards governing the production of food operate; economic theories of the firm and fundamental calculations in finance as the foundation for cost/benefit analyses of existing and proposed regulations; applications to U.S. and global regulations and standards.

AGEC 639/SCSC 635 Comparative Global Standards in Food Systems
Credits 3. 3 Lecture Hours.
Laws, regulations and standards governing the production, distribution, processing and marketing of food across regions of the world; international standard setting bodies and risk assessment committees; regulatory equivalency and harmonization; product approval procedures; cost/benefits of global standards and trade agreements.
Cross Listing: SCSC 635/AGEC 639.

AGEC 641 Operations Research Methods in Agricultural Economics
Credits 3. 3 Lecture Hours.
Theory and practice regarding the application of operations research tools to agricultural economics problem areas. Mainly concentrates on optimization approaches.
Prerequisite: AGEC 622.

AGEC 643 Applied Simulation in Agricultural Economics
Credits 3. 3 Lecture Hours.
Design, construction, validation and use of Monte Carlo simulation models for risk analysis of economic systems; parameter estimation and simulation of multivariate probability distributions in econometric and behavioral models used for business and policy analysis under risk.
Prerequisites: AGEC 622 and AGEC 661 or approval of instructor.

AGEC 645 AGRI CONSUMPTION ANALY
Credits 3. 3 Lecture Hours.
AGEC 652 International Agribusiness Trade Analysis
Credits 3. 3 Lecture Hours.
Traditional trade theory encompassing the concepts of comparative advantage, the Hecksher-Olin-Samuelson model, the gain from specialization and trade, partial equilibrium analysis of free trade, violation of the free trade model, welfare effects of trade, trade creation and diversion, introduction to growth and development theories, the relationship between trade and development and related concepts.
Prerequisites: ECON 607 and MATH 142.

AGEC 659 Ecological Economics
Credits 3. 3 Lecture Hours.
Study of the relationships between ecosystems and economic systems; understanding the effects of human economic endeavors on ecological systems and how the ecological benefits and costs of such activities can be quantified and internalized.
Prerequisite: Graduate classification.

AGEC 661 Applied Econometric Methods in Agriculture
Credits 3. 3 Lecture Hours.
Application of econometric methods in a theoretical framework for the analysis of agricultural markets and farm firm behavior; emphasis on specifying and estimating agricultural production and demand functions and agricultural sector models; selected topics according to student needs.
Prerequisite: ECMT 676.

AGEC 671 Fundamentals in Agribusiness and Managerial Economics
Credits 3. 3 Lecture Hours.
Economic theory and methods for analyzing operational and strategic problems facing managers of food, fiber and resource businesses; financial, marketing and management topics, including principal-agent, bargaining power, contract theory and business forecasting.
Prerequisites: ECON 629 and ECON 630.

AGEC 672 Fundamentals in Agricultural Markets and Information Economics
Credits 3. 3 Lecture Hours.
Application of information economics theory for analysis of vertical and horizontal relationships between firms along the supply chain.
Prerequisites: AGEC 636 and 661; ECMT 676; ECON 629 and ECON 630.

AGEC 673 Fundamentals in Resource and Environmental Economics
Credits 3. 3 Lecture Hours.
Economic theories and empirical regularities related to the use and management of the environment and natural resources; valuation techniques, externalities, and intertemporal resource management.
Prerequisites: AGEC 635, AGEC 636, AGEC 637; ECON 629 and ECON 630.

AGEC 674 Food and Agricultural Trade and Policy Analysis
Credits 3. 3 Lecture Hours.
Trade policy, farm policy, macroeconomic policy, resource policy and development policy; analysis of policy impacts outside perfect competition and free trade assumptions.
Prerequisites: AGEC 614 and AGEC 652 or approval of instructor.

AGEC 676 Frontiers in Markets and Information Economics
Credits 3. 3 Lecture Hours.
Exploration of advanced topics in the field of markets and information economics. May be taken twice for credit.
Prerequisite: Graduate classification.

AGEC 677 Frontiers in Natural Resource and Environmental Economics
Credits 3. 3 Lecture Hours.
Exploration of advanced topics in the field of natural resource and environmental economics. May be taken twice for credit.
Prerequisite: Graduate classification.

AGEC 681 Seminar
Credit 1. 1 Lecture Hour.
Objectives are to define research problems, develop research problem statements with objectives and hypothesis and specify relevant models to accomplish the objectives and develop the skills in written communication.

AGEC 684 Professional Internship
Credits 1 to 3. 1 to 3 Other Hours.
Pre-professional experience within department guidelines conducted in the area of the student's field of interest.
Prerequisite: Graduate classification.

AGEC 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed individual study of a selected problem in the field of agricultural economics.

AGEC 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of agricultural economics. May be repeated for credit.

AGEC 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Thesis or dissertation research.

AGEC 693 Professional Study
Credits 1 to 9. 1 to 9 Other Hours.
Professional paper undertaken as a requirement for the Master of Science Non-Thesis or as an elective for the Master of Agribusiness. May be taken more than once, but not to exceed 3 hours of credit towards a degree.
Prerequisite: Approval of instructor.

AGEC 695 Frontiers in Agribusiness and Managerial Economics
Credits 3. 3 Lecture Hours.
Exploration of advanced topics in the field of agribusiness and managerial economics. May be taken two times for credit.
Prerequisite: Graduate classification.

AGLS - Ag & Life Sciences

Courses

AGLS 101 Modern Agricultural Systems and Renewable Natural Resources
Credit 1. 1 Lecture Hour.
(AGRI 1131, 1231) Modern Agricultural Systems and Renewable Natural Resources. An introduction to modern agriculture and the natural, human and scientific resources upon which it depends. Freshman or sophomore classification.

AGLS 105 Research in Agriculture and Life Sciences
Credit 1. 1 Lecture Hour.
An introduction to the research process as applied to agriculture, renewable natural resources and biological sciences.
Prerequisite: Freshman classification, major in College of Agriculture and Life Sciences and approval of instructor.
AGLS 125 Life Sciences Learning Community I
Credit 1. 1 Lecture Hour.
Development of personal and professional competencies in the life sciences: learning styles, leadership skills, appreciation for the arts; ethics in science, problem solving skills, experimental design, data gathering and interpretation, introduction to life sciences literature, critical analysis skills, and the connectivity between life science disciplines. May be taken two times for credit.
Prerequisites: Freshman classification and approval of instructor.

AGLS 225 Life Sciences Learning Community II
Credit 1. 1 Lecture Hour.
Continuation of the development of personal and professional competencies in the life sciences: ethics in science, problem solving skills, experimental design, data gathering and interpretation, examination of life sciences literature, critical analysis skills, and the connectivity between life science disciplines. May be taken two times for credit.
Prerequisites: Freshman classification and approval of instructor.

AGLS 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of agriculture and life science. May be repeated for credit.
Prerequisite: Freshman or sophomore.

AGLS 292 Cooperative Education in Agriculture
Credits 2. 4 Other Hours.
Educational work assignment by a student in the field of his or her career interest and course of study; supervision of the student by the cooperating employer and the instructor; a technical report, approved by the instructor, on a related subject area required.
Prerequisite: Approval of the college coordinator of cooperative education.

AGLS 301 College of Agriculture and Life Sciences Study Abroad
Credits 1 to 18. 1 to 18 Other Hours.
For students in approved programs abroad. May be repeated for credit.
Prerequisites: Admission to approved program and approval of academic dean.

AGLS 392 Cooperative Education in Agriculture
Credits 2. 4 Other Hours.
Educational work assignment by a student in the field of his or her career interest and course of study. Supervision of the student by the cooperating employer and the instructor; a technical report, approved by the instructor, on a related subject area required.
Prerequisite: AGLS 292.

AGLS 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of agricultural and life sciences.

AGLS 492 Cooperative Education in Agriculture
Credits 2. 4 Other Hours.
Educational work assignment by a student in the field of his or her career interest and course of study; supervision of the student by the cooperating employer and the instructor; a technical report, approved by the instructor, on a related subject area required.
Prerequisite: AGLS 392.

AGLS 600 Agriculture and Life Sciences Graduate Study Abroad
Credits 1 to 18. 1 to 18 Other Hours.
Approved study abroad student participation; reciprocal educational exchange programs. May be taken two times for credit.
Prerequisite: Admission to approved program.

AGLS 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of agriculture and life science. May be repeated for credit.
Prerequisites: Graduate classification and approval of instructor.

AGSC - Agricultural Science

Courses
AGSC 285 Directed Studies
Credits 1 to 4. 1 to 4 Lecture Hours.
Directed individual study of selected problems in agricultural science with emphasis on collection, analysis and presentation of information. May be repeated for credit.
Prerequisite: Approval of instructor.

AGSC 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Special topics in an identified area of agricultural science. May be repeated for credit.
Prerequisite: Approval of department head.

AGSC 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in agricultural science. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

AGSC 301 Introduction to Agricultural Science Teaching
Credits 3. 3 Lecture Hours.
Introduction to agricultural science teaching at the secondary level; an overview of preparing teachers for a changing world including knowledge of learners, subject matter and teaching within the context of agricultural science.
Prerequisite: Junior or senior classification.

AGSC 373 Managing Safety in the Agricultural Science Program
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Safety principles and procedures, methods of teaching and motivating students in agricultural mechanics; design for those preparing to teach agricultural science in Texas public schools.
Prerequisite: Junior or senior classification.

AGSC 380 Workshop in Agricultural Science
Credits 1 to 4. 1 to 4 Lecture Hours.
The study, understanding and solution of human-agricultural problems based on theory learned in the classroom, library, laboratory and fieldwork completed by individuals and teams.
Prerequisite: Junior or senior classification.

AGSC 383 Teaching Agricultural Mechanics
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Methods of teaching and motivating students in agricultural mechanics; designed for students preparing to teach agricultural science in Texas public schools.
Prerequisite: AGSC 301.
AGSC 384 Clinical Professional Experience in AGSC
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Clinical field experience for students preparing to teach agricultural science in public schools of Texas; through first-hand observation, students will study learning theories, individual differences, teaching methods, classroom management, curriculum, school climate and culture, and teacher roles and responsibilities.
Prerequisite: AGSC 301.
AGSC 402 Designing Instruction for Secondary Agricultural Science Programs
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Theory and practice in designing instruction for secondary agricultural science programs including effective planning and delivery methods; designed for students preparing to teach agricultural science in Texas public schools.
Prerequisites: AGSC 384; concurrent enrollment in AGSC 405.
AGSC 405 Facilitating Complete Secondary Agricultural Science Programs
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Theory and practice in facilitating secondary agricultural science programs: includes classroom instruction, supervised experience, and youth leadership development; designed for students preparing to teach agricultural science in Texas public schools.
Prerequisites: AGSC 384; concurrent enrollment in AGSC 405.
AGSC 425 Learner Centered Instruction in Agricultural Science
Credits 3. 3 Lecture Hours.
Planning for and teaching secondary agricultural science in selected high schools in Texas; includes 12 weeks of professional teaching experience under the guidance of a university supervisor and a cooperating teacher in the school.
Prerequisites: Senior classification; completion of the prerequisite sequence of professional courses in agricultural education; full admission into student teaching.
AGSC 436 Professional Teaching Internship in AGSC
Credits 6. 2 Lecture Hours. 12 Lab Hours.
Supervised internship and independent study related to student's professional interest.
Prerequisites: Junior or senior classification and approval of instructor.
AGSC 481 Seminar
Credit 1. 1 Lecture Hour.
Review of current literature and research as related to program development in light of legislation and policies affecting education in agriculture.
Prerequisite: Approval of department head.
AGSC 484 Field Experience
Credits 1 to 6. 1 to 6 Other Hours.
An on-the-job supervised experience program conducted in the area of the student's specialization.
Prerequisites: Senior classification; 2.0 GPR; approval of department head.
AGSC 485 Directed Studies
Credits 1 to 4. 1 to 4 Lecture Hours.
Directed individual study of selected problems in agricultural science with emphasis on collection, analysis and presentation of information. May be repeated for credit.
Prerequisite: Junior or senior classification; approval of instructor.
AGSC 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Special topics in an identified area of agricultural science. May be repeated for credit.
Prerequisite: Approval of department head.
AGSC 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in agricultural science. May be repeated 3 times for credit. Registration in multiple sections of this course are possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor.
AGSC 494 Internship
Credits 1 to 6. 1 to 6 Other Hours.
Supervised internship and independent study related to student's professional interest.
Prerequisites: AGSC 301; junior or senior classification; 2.0 GPR; approval of instructor.

AGSM - Agricultrl Systems Mgmt

Courses
AGSM 125 Introduction to Agricultural Systems Management
Credit 1. 2 Lab Hours.
Introduction to technical management of agricultural systems using management projects presented by agricultural managers from industry; problem definition, information search, idea generation and development of management solutions.
Prerequisite: Freshman or sophomore classification or approval of instructor; majors only.
AGSM 201 Agricultural Energy and Power Systems
Credits 3. 2 Lecture Hours. 2 Lab Hours.
(AGRI 2301) Agricultural Energy and Power Systems. A study of the types of power and energy sources used in agricultural equipment and systems; management considerations for selecting, operating and maintaining internal combustion engines, electric equipment and motors, and renewables as power sources.
AGSM 285 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Selected problems in any phase of agricultural systems management; credit and specific content dependent upon background, interest, ability and needs of student enrolled; individual consultations and reports required.
Prerequisites: Freshman or sophomore classification; approval of department head.
AGSM 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of agricultural systems management. May be repeated for credit.
Prerequisite: Approval of instructor.
AGSM 291 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the direction of faculty member in agricultural systems management.
Prerequisites: Freshman or sophomore classification and approval of instructor.
AGSM 301 Systems Analysis in Agriculture
Credits 3. 3 Lecture Hours.
Operations research and systems theory applied to management problems in food and agricultural industries; linear programming, queuing theory, simulation and critical path method; provides the knowledge and computer skills to better manage resources for the evolving agricultural industries.
Prerequisite: MATH 141 and MATH 142 or equivalent; junior or senior classification or approval of instructor.
AGSM 310 Agricultural Machinery Management
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Selection of a matched complement of power units and machines for farming operations; consider constraints such as crops, season, weather, personnel and capital; apply systems techniques such as linear programming, optimization, queuing theory and inventory models; utilize available software programs and learn to develop electronic spreadsheets and other customized software.
Prerequisites: AGSM 301; AGEC 330; or registration therein.
AGSM 315/FSTC 315 Food Process Engineering Technology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Elementary mechanics, physical properties of food and processing materials, heat transfer, temperature measurement, solar heating and cooling, refrigeration and insulation, dehydration as applied to foods and food processing.
Prerequisite: AGSM 301; AGEC 330; or registration therein.
Cross Listing: FSTC 315/AGSM 315.
AGSM 325 Agri-Industrial Applications of Electricity
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Elements of electric current generation and transmission, applications of electric heating, lighting and power, wiring, motors, energy rates, meter reading, safety rules and regulations.
Prerequisite: Agricultural systems management majors only or approval of instructor.
AGSM 335 Water and Soil Management
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Elementary principles of surface and ground water supply, flood control, water distribution systems and irrigation systems; principles of drainage, soil conservation and erosion control; elementary surveying, chaining, leveling and mapping applied to agricultural and natural resource needs; illustrated by practical examples of terracing and farm pond design.
Prerequisite: AGSM 301.
AGSM 337 Technology for Environmental and Natural Resource Engineering
Credits 3. 3 Lecture Hours.
For the nonengineering student in the environmental and management sciences; concentrates on the application of technology for solving local environmental problems while considering global issues; reduction of water, air and hazardous waste pollutants; legislative issues and modeling.
Prerequisites: AGSM 301 and MATH 142.
AGSM 355 Energy and Conversion Systems
Credits 3. 3 Lecture Hours.
Basic physical conversion principles of energy use, including historical and future patterns; conservation measures, alternative energy sources, and the environment impact of U.S. and world energy use.
Prerequisites: Junior or senior classification; non-majors only.
AGSM 360 Occupational Safety Management
Credits 3. 3 Lecture Hours.
Safety considerations in the work environment, including safety mandates, safety mission, personal and business liability, fire, chemical, dust, machine noise, personal protective devices; design and implementation of safety programs.
AGSM 403 Processing and Storage of Agricultural Products
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Factors influencing the nature of biological materials and the preservation of quality throughout the harvesting, handling and processing system; a systems approach to cereal grains includes principles of drying, quality deterioration, storage, conveying and handling; processing of fiber crops.
Prerequisites: AGSM 310 and AGSM 315/FSTC 315.
AGSM 435 Irrigation Principles and Management
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Principles of irrigation and management for efficient use of water; soil-water-plant relationships; methods of application; power and labor requirements; automated systems and components.
Prerequisites: AGSM 335, AGSM 301, MATH 141.
AGSM 439 Management of Agricultural Systems I
Credits 3. 3 Lecture Hours.
Application of agricultural systems management principles in solving realistic problems faced by agribusiness managers; project selection from problems posed by biological and agricultural industrial consultants; project feasibility study and outline; management and application philosophy; teamwork and communication, economics; product liability and reliability; standards and codes; goal setting and time management.
Prerequisites: AGSM 301, AGSM 315/FSTC 315, AGSM 325, and AGSM 360; AGSM 335, AGSM 337 and AGSM 403 or registration therein; senior classification; must be taken prior to AGSM 440; AGSM majors only.
AGSM 440 Management of Agricultural Systems II
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Management of agricultural systems through team solution of management problems posed by agribusiness managers, farmers, extension specialists and other industry consultants; application of management principles to give students experience in solving realistic problems faced by agribusiness managers; critical evaluation of results by students, staff and consultants.
Prerequisites: AGSM 439; should be taken last spring semester prior to graduation.
AGSM 461/SPSC 461 Geographic Information Systems for Resource Management
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Geographic Information System (GIS) approach to the integration of spatial and attribute data to study the capture, analysis, manipulation and portrayal of natural resource data; examination of data types/formats; integration of GIS with remote sensing and Global Positioning System; lab use of GIS applications to conduct analyses of topics in natural resources.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: SPSC 461/AGSM 461.
AGSM 470 Agricultural Electronics and Control
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Technology of electronic systems in agricultural production and processing, sensors, actuators, and controllers, controller hardware and computer bases.
Prerequisite: AGSM 325.
AGSM 473 Project Management for Agricultural Systems Technology
Credits 3. 3 Lecture Hours.
Development of fundamental skill set in project management; basic knowledge of project management methods, tools and techniques; includes organization and life cycle, management processes, integration management, time management, cost management, quality management, communications management, risk management, procurement management, stakeholder management.
Prerequisites: AGSM 301 and senior classification.

AGSM 475 Applied Information Technologies for Agricultural Systems
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Definition and documentation of the value of information in agriculturally-based technology companies; methods for mapping information flow within the company and across companies; articulation value of information within a value chain for a food product by simulation; and projects using project management software and web-based interactions.
Prerequisites: ISYS 209 or equivalent; junior or senior classification.

AGSM 481 Seminar
Credit 1. 1 Lecture Hour.
Professional development; ethics; career opportunities and topics of interest related to the practice of agricultural systems management.
Prerequisite: Senior classification.

AGSM 485 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Selected problems in any phase of agricultural systems management; credit and specific content depend on background and interest of student; includes organization and life cycle, management processes, integration management, time management, cost management, quality management, communications management, risk management, procurement management, stakeholder management.
Prerequisites: ISYS 209 or equivalent; junior or senior classification.

AGSM 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Special topics in an identified area of agricultural systems management. May be repeated for credit.

AGSM 491 Research
Credits 0 to 3. 0 to 3 Lecture Hours.
Research conducted under the direction of faculty member in agricultural systems management. May be repeated 2 times for credit. Registration in multiple sections of this course are possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor.

ALEC 291 Research
Credits 1 to 4. 1 to 4 Lecture Hours.
Research conducted under the direction of faculty member in agricultural communications and journalism. May be taken two times for credit.
Prerequisites: Freshman or sophomore classification and approval of department advisor.

ALEC 350 Global Agricultural Issues
Credits 3. 3 Lecture Hours.
Review of global agricultural issues (products, environment, people, and culture) affecting international agricultural development; concepts and principles underlying the processes of teaching, research, and service opportunities in international agricultural development and education situations.
Prerequisites: Junior or senior classification or approval of instructor; GEOG 202.

ALEC 380 Workshop in Agricultural Leadership, Education, and Communications
Credits 1 to 4. 1 to 4 Lecture Hours.
The study, understanding and solution of human-agricultural problems based on theory learned in the classroom, library, laboratory and fieldwork completed by individuals and teams. May be taken three times for credit.
Prerequisite: Junior or senior classification.

ALEC 412 Technology-Enhanced Instructional Design Strategies for Agriculture
Credits 3. 3 Lecture Hours.
Techniques and applications of technology to enhance instruction of agricultural topics; instructional design principles, instructional strategies, technological tools; the design, development and delivery of technology-enhanced instruction for agriculture and the life sciences. Not intended for majors in education.
Prerequisite: Junior or senior classification.

ALEC 450 Global Social Justice Issues in Agriculture
Credits 3. 3 Lecture Hours.
An in-depth evaluation of global social justice issues and leadership skills necessary to effectively solve and manage issues in agricultural development; topics include awareness, knowledge and understanding of teaching, research and service opportunities for those seeking careers in global social justice and agricultural leadership.
Prerequisite: Junior or senior classification or approval of instructor.

ALEC 460 Applying International Development Theories in Agriculture
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Practical application of agricultural development theories (geographical, communal, societal, etc.) in real-world settings; high-impact learning, research skill development, international travel and participation in a service-learning project with an international non-governmental organization.
Prerequisites: Junior or senior classification or approval of instructor.
ALEC 485 Directed Studies  
**Credits 1 to 4. 1 to 4 Other Hours.**  
Directed individual study of selected problems in international agriculture leadership, education and communications. May be taken four times for credit.  
**Prerequisites:** Junior or senior classification; approval of department advisor.

ALEC 489 Special Topics in...  
**Credits 1 to 4. 1 to 4 Lecture Hours.**  
Special topics in an identified area of international agriculture leadership, education, and communications. May be taken four times for credit.  
**Prerequisite:** Junior or senior classification.

ALEC 491 Research  
**Credits 1 to 4. 1 to 4 Lecture Hours.**  
Research conducted under the direction of faculty member in international agricultural leadership, education, and communications. May be taken three times for credit.  
**Prerequisites:** Junior or senior classification; approval of department advisor.

ALEC 494 Internship  
**Credits 1 to 6. 1 to 6 Other Hours.**  
Supervised internship and independent study related to the student's professional interest. May be taken six times for credit.  
**Prerequisites:** Junior or senior classification; approval of departmental advisor.

ALEC 601 Advanced Methods in Agricultural Education  
**Credits 3. 3 Lecture Hours.**  
Learning theories; techniques and procedures to enhance the teaching-learning process; methods to evaluate learning.

ALEC 602 Advanced Instructional Design in Agricultural Science  
**Credits 3. 3 Lecture Hours.**  
Designing instruction to meet learning outcomes, motivate students, and evaluate objectives; learning theories and their impact on the teaching and learning process; choosing appropriate teaching methods for specific content; evaluating the teaching-learning process for improvement within the context of secondary agricultural science classrooms.  
**Prerequisites:** Approval of instructor, graduate classification.

ALEC 603 Experiential Learning  
**Credits 3. 3 Lecture Hours.**  
Theory and practice in facilitating learning from experiences in formal, informal, and non-formal settings; experiential learning in classroom/laboratory settings, guided inquiry, internships/externships, service learning, project-based learning, and outdoor/adventure learning.  
**Prerequisite:** Graduate classification.

ALEC 604 Writing for Professional Publication  
**Credits 3. 3 Lecture Hours.**  
Provides students in Agricultural and Extension Education with the skills necessary to compose research manuscripts, conference papers, and journal articles.  
**Prerequisites:** Introductory research course and graduate classification.

ALEC 605 Facilitating Complete Secondary Agricultural Science Programs  
**Credits 3. 3 Lecture Hours.**  
Theory and practice in facilitating secondary agricultural science programs that include classroom instruction, supervised experience, and youth leadership development. Designed for students preparing to teach agricultural science in Texas public schools.

ALEC 606 Foundations of Leadership Theory  
**Credits 3. 3 Lecture Hours.**  
Theory and Practice of leadership theory foundational to leadership education. Focus on analysis of leadership theories and models; synthesis of leadership theory as a philosophy; and application of leadership theories in various professional settings. Stacked with ALED 340.

ALEC 607 Youth Leadership Programs  
**Credits 3. 3 Lecture Hours.**  
Methods and procedures of organizing and conducting youth leadership programs in school and non-school settings.  
**Prerequisite:** Professional experience or approval of department head.

ALEC 608 Leadership of Volunteers  
**Credits 3. 3 Lecture Hours.**  
Models of volunteerism; reasons for volunteers; assessment and evaluation techniques; task descriptions; organizational relationships.

ALEC 609 Learning Organizations  
**Credits 3. 3 Lecture Hours.**  
Theory of instruction to support education in social systems language and archetypes; systems thinking theory including mental models; mastery, team learning, concept models of human organizations.  
**Prerequisites:** ALED 340; graduate classification.

ALEC 610 Principles of Adult Education  
**Credits 3. 3 Lecture Hours.**  
Identification of basic principles motivating adults to learn. Procedures to implement these principles in bringing about changes in adult behavior.  
**Prerequisite:** Professional experience or approval of department head.

ALEC 611 Advanced Methods in Distance Education  
**Credits 3. 3 Lecture Hours.**  
Course design theory for synchronous and asynchronous instructional methodology; teaching and training models for distance education.

ALEC 612 Advanced Instructional Design for Online Learning  
**Credits 3. 3 Lecture Hours.**  
Emphasis on applying learning and teaching theory as the foundation for developing engaging online instruction; designed to pull together theory, concepts, and strategies for a broad understanding of the fundamentals of online learning from the conceptual stage to the development and delivery stages.  
**Prerequisites:** Majors only and graduate classification.

ALEC 613 Techniques in eLearning Development and Delivery  
**Credits 3. 3 Lecture Hours.**  
Provides the knowledge and skills necessary to develop and deliver effective online courses, training programs, and learning units; specific topics include: management of eLearning projects, needs assessment and audience analysis, creation and editing of documents, images, audio, and video.  
**Prerequisites:** Majors only and graduate classification.

ALEC 615 Philosophy of Agricultural Education  
**Credits 3. 3 Lecture Hours.**  
Historical and philosophical developments in education that brought about education in agriculture; ideas of individuals that culminated in agricultural education institutions and organizations.

ALEC 616 Facilitation of Leadership Programs  
**Credits 3. 3 Lecture Hours.**  
Investigate models to design leadership education programs; incorporate strategies to enhance the leadership education process; critically analyze leadership education research and group leadership education processes.  
**Prerequisite:** ALED 340 or ALEC 606.
ALEC 617 Leadership in Organizational Culture and Ethics
Credits 3. 3 Lecture Hours.
Integration of organizational culture and ethical theories; implications and role of leaders in organizational culture and ethical situations; critical analysis of organizational culture and ethics in agricultural organizations.
Prerequisite: Graduate classification.

ALEC 620 Instrumentation and Survey Research Methods
Credits 3. 3 Lecture Hours.
Principles, theories, techniques, and applications for developing survey questionnaires and conducting survey research in agriculture; developing questions; constructing instruments; implementing surveys; and reducing coverage and sampling errors.

ALEC 621 Methods of Online Survey Research in Agricultural Science
Credits 3. 3 Lecture Hours.
Students explore the technical requirements necessary to correctly establish and administer online social science data collection instruments. Specific skills include writing *.asp code, database design and management, verification/permission sets, creating informational pop-ups, drop-down menus, and assorted graphics.
Prerequisite: ALEC 690 or similar Theory of Research course.

ALEC 622 Data Collection, Analysis, and Interpretation in Research in ALEC
Credits 3. 3 Lecture Hours.
Data Collection, Analysis, and Interpretation in Research in Agricultural Leadership, Education, and Communications. Principles and techniques of data collection, analysis, and interpretation in agricultural leadership, education, and communications; interpretation and implications of findings/results in relation to current research; data analysis performed using statistical package software; collection, analysis, and interpretation to conform to published research in agricultural leadership, education, and communications.
Prerequisite: Research methods and basic statistics courses.

ALEC 623 Survey of Evaluation Strategies for Agriculture
Credits 3. 3 Lecture Hours.
Designed to pull together theory, concepts, and strategies to give a broad understanding of the fundamentals of evaluation and to provide the knowledge and skills necessary to design and administer appropriate and effective evaluations.
Prerequisite: Graduate classification.

ALEC 624 Developing Funded Research Projects
Credits 3. 3 Lecture Hours.
Students team with faculty mentor to develop a proposal for external funding from a federal agency; principles discussed to produce competitive proposals; proposal steps adapted to fit interests of the students and faculty.
Prerequisite: Approval of instructor.

ALEC 625 Program Evaluation and Organizational Accountability
Credits 3. 3 Lecture Hours.
Examines the philosophy, methods, and issues of accountability and evaluation necessary to meet expectations of institutional mandates. Special emphasis on analytical tools and performance measures.
Prerequisite: Professional experience or approval of department head.

ALEC 630 Guidance and Counseling for Rural Youth
Credits 3. 3 Lecture Hours.
Problems of youth with special attention given to rural youth; theories of vocational development reviewed and techniques and procedures developed to help youth make career choices.

ALEC 631 Development and Planning of Community Education Programs
Credits 3. 3 Lecture Hours.
Focuses on the principles, theories, techniques, and applications for developing and planning educational program in a community setting; program development strategies, focusing educational programming in relation to issues identified citizens will be developed and enhanced in this course.
Prerequisite: Graduate classification.

ALEC 640 Methods of Technological Change
Credits 3. 3 Lecture Hours.
Dynamics of cultural change as theoretical framework for planned technological change; methods of planning and implementing change, its effects and how it can be predicted.

ALEC 644 The Agricultural Advisor in Developing Nations
Credits 3. 3 Lecture Hours.
Trends, conditions, critical incidents, techniques, roles and preparation affecting the success of persons desiring to provide technical assistance in projects of agricultural development by serving as agricultural advisors in developing nations, especially in cross-cultural settings.
Prerequisite: Approval of instructor.

ALEC 645 Initiating, Managing and Monitoring Projects of International Agricultural Development
Credits 3. 3 Lecture Hours.
Origin of projects in agricultural development involving host governments; procedures in developing contracts with sponsors; duties and responsibilities of contract administrators, project leaders and the home institution; reporting systems, project reviews and evaluation procedures; procedures effective in managing projects.
Prerequisite: ALEC 640 or approval of instructor.

ALEC 646 Institutions Serving Agriculture in Developing Nations
Credits 3. 3 Lecture Hours.
Comparisons among programs and functions, strengths and weaknesses, organization, and relationships of institutions and agencies in public sectors serving agriculture in developing nations; includes those responsible for agricultural extension, agricultural research, agrarian reform, price stabilization, agricultural credit and agricultural cooperatives.
Prerequisite: Approval of instructor.

ALEC 652 Images of Agriculture: Visual Communication Research
Credits 3. 3 Lecture Hours.
Explore visual communication from theoretical, physiological, and interpretive perspectives as it applies to media images used to depict agriculture and agricultural issues; current research in visual communication and its application to agriculture; use of visible images in agricultural communication research.
Prerequisite: ALEC 695 or introductory research methods.

ALEC 681 Seminar
Credit 1. 1 Lecture Hour.
Group study and discussion of current developments in agricultural education; research and legislation as they affect programs in teacher education, agricultural science and related areas of education.

ALEC 684 Professional Internship
Credits 1 to 6. 1 to 6 Other Hours.
On-the-job supervised experience program conducted in the area of the student's specialization.
Prerequisites: Graduate classification.
ALEC 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Studies related to classroom, laboratory, supervised activities in agriculture, work experience, extension education and adult educational activities in agricultural programs.

ALEC 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of agricultural education. May be repeated for credit.

ALEC 690 Theory of Agricultural Education Research
Credits 3. 3 Lecture Hours.
Theory and design of research problems in agricultural education; communication of research proposal and results of research; evaluation of current research of faculty and students; review of current research literature. May be taken three times for credit.
Prerequisite: Approval of major advisor.

ALEC 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Initiation and completion of research for advanced degree.
Prerequisite: Approval of department head.

ALEC 692 Professional Study
Credits 1 to 23. 1 to 23 Other Hours.
Approved professional study of project undertaken as the terminal requirement for degree of Doctor of Education; preparation of a record of study summarizing the rationale, procedure and results of the completed project.
Prerequisite: Approval of major advisor.

ALEC 693 Professional Study in Agricultural Leadership Education and Communications
Credits 1 to 3. 1 to 3 Other Hours.
Approved professional paper undertaken as the requirement for the Master of Agriculture. May be taken more than once, but not to exceed 3 hours of credit toward a degree.
Prerequisite: Graduate classification.

ALEC 695 Frontiers in Research
Credits 3. 3 Lecture Hours.
Basic concepts of quantitative and qualitative research; understanding the social science research process; using appropriate methods to address research problems; enabling students to effectively evaluate, consume, and communicate research findings.

ALEC 696 Qualitative Research Methods
Credits 3. 3 Lecture Hours.
Overview of qualitative research in agricultural education including conducting a literature review, writing a working hypothesis, keeping methodological and reflexive journals, developing data gathering tools, performing data analysis, ensuring trustworthiness measures, and writing a research manuscript.
Prerequisites: ALEC 690 or ALEC 695 and graduate classification.

ALEC - Ag Leadership & Dev

Courses

ALED 125 Leadership Learning Community I
Credit 1. 1 Lecture Hour.
Offered to students living in the Freshmen Leadership Living Learning Community; fundamentals of developing personal leadership while participating in co-curricular activities; emphasis on the relational model of leadership and global perspective building.
Prerequisites: Freshman classification or approval of instructor; on-campus residence.

ALED 202 Introduction to Leadership
Credits 3. 3 Lecture Hours.
Introduction to the academic and scholarly development of leadership theory and leadership models; investigation of leadership theory when applied to a specific context; development of a leadership definition as an inquiry investigation.

ALED 222 Practicing Diverse Leadership and Cultural Exploration
Credits 3. 3 Lecture Hours.
Social theories and historical perspectives of leadership, particularly in terms of class, gender, race, ethnicity, and nationality; multidisciplinary approach to the study of leadership with a special emphasis on culture completed through readings, class lectures, films, group projects and discussions.
Prerequisite: Membership in the Multicultural Services Culture Leadership, Understanding and Exploration for Sophomores Learning Community.

ALED 223 Practicing Diverse Leadership and Cultural Exploration
Credits 3. 3 Lecture Hours.
Social theories and historical perspectives of leadership, particularly in terms of class, gender, race, ethnicity, and nationality; multidisciplinary approach to the study of leadership with a special emphasis on culture through experiential learning.
Prerequisites: ALED 222 and membership in the Multicultural Services Cultural Leadership, Understanding, and Exploration for Sophomores Learning Community.

ALED 225 Leadership Learning Community II
Credit 1. 1 Lecture Hour.
Offered to students living in the Freshmen Leadership Living Learning Community; fundamentals of peer mentoring while participating in co-curricular activities; emphasis on building supportive relationships on a college campus.
Prerequisites: Freshman classification or approval of instructor; on-campus residence; ALED 125.

ALED 285 Directed Studies in Agricultural Leadership and Development
Credits 1 to 4. 1 to 4 Other Hours.
Directed study of selected issue in agricultural leadership and development with emphasis on collection, synthesis and interpretation of information.
Prerequisite: Approval of department advisor.

ALED 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Special topics in an identified area of agricultural development. May be repeated for credit.
Prerequisite: Approval of department advisor.
ALED 291 Research
Credits 1 to 4. 1 to 4 Lecture Hours.
Research conducted under the direction of faculty member in agricultural development. May be repeated 2 times for credit. Please see academic advisor in department.
Prerequisites: Freshman or sophomore classification and approval of instructor.

ALED 301 Personal Leadership Education
Credits 3. 3 Lecture Hours.
Development, application and reflection of personal leadership capabilities through self-assessments and experiential learning activities; development of leadership identity through personal leadership inventories including strengths, personality type, values, vision and emotional intelligence.
Prerequisite: ALED or USAL-LED major, junior or senior classification, ALED 202.

ALED 313 Culture Theory, Orientation and Adaptation
Credits 3. 3 Lecture Hours.
Evaluation of culture theory, elements and manifestations of culture, assessing cultural norms of society or groups, adaptation to a new culture for effective leadership.
Prerequisite: Junior or senior classification.

ALED 339 Agricultural Extension Philosophy and the Land-Grant Mission
Credits 3. 3 Lecture Hours.
Philosophy of Cooperative Extension and roles within the land-grant system; history, organization, program areas and guiding principles; relationship with the teaching and research branches of the land-grant system.
Prerequisite: Junior or senior classification or approval of instructor.

ALED 340 Survey of Leadership Theory
Credits 3. 3 Lecture Hours.
Exploration of leadership as a scholarly discipline; critical analysis of and evolution of multiple leadership models and theories; synthesis of leadership theory through experiential learning; integration of course content with personal experiences.
Prerequisite: ALED or USAL-LED major, junior or senior classification, ALED 202.

ALED 341 Team Learning
Credits 3. 3 Lecture Hours.
Team development theory; emphasizes research on team member behaviors, team decision making models and positive conflict in team environments.
Prerequisites: ALED 340; junior or senior classification.

ALED 342 Learning Organizations
Credits 3. 3 Lecture Hours.
Social systems language and archetypes; systems thinking theory including mental models, mastery, team learning, concept models of human organizations.
Prerequisites: ALED 340; junior or senior classification.

ALED 343 Human Resource Management in Agriculture and Life Sciences
Credits 3. 3 Lecture Hours.
Principles, theories, concepts, techniques and applications for managing human resources in food and agricultural organizations and in local communities; attracting, staffing, training, developing and compensating human talent. Not intended for majors in business.
Prerequisites: ALED 340; junior or senior classification.

ALED 344 Leadership of Volunteers
Credits 3. 3 Lecture Hours.
Principles, theories, concepts, techniques and applications for leading volunteers in agriculture and life sciences nonprofit, governmental and community organizations.
Prerequisites: ALED 340; junior or senior classification.

ALED 380 Workshop in Agricultural Leadership and Development
Credits 1 to 4. 1 to 4 Lecture Hours.
The study, understanding and solution of human-agricultural problems based on theory learned in the classroom, library, laboratory and fieldwork completed by individuals and teams.
Prerequisite: Junior or senior classification.

ALED 400 Public Leadership Development
Credits 3. 3 Lecture Hours.
Major issues in the study of public leadership, development of leadership skills, and a field investigation done in conjunction with local public leaders.
Prerequisites: Junior classification and approval of instructor.

ALED 401 Advanced Professional Leadership Development
Credits 3. 3 Lecture Hours.
Investigation of the best practices of successful leaders representing various organizational contexts; merging of scholarly mastery of theory with practice.
Prerequisites: Selection for ALED Leadership Fellows Program; ALED 340 or ALED 301; junior or senior classification.

ALED 422 Cultural Pluralism in Agriculture
Credits 3. 3 Lecture Hours.
Selected topics on the diversity of human resources in agriculture; emphasis on working in a multicultural society and developing a sensitivity toward different cultures; explores the interrelationships between the contributions of diverse individuals and the state, nation and global success of agriculture.
Prerequisite: Junior or senior classification.

ALED 424 Applied Ethics in Leadership
Credits 3. 3 Lecture Hours.
Exploration of ethical and moral theories and the application to multiple leadership contexts and situations.
Prerequisites: Junior or senior classification, ALED 301.

ALED 426 Leading and Training Adult Learners
Credits 3. 3 Lecture Hours.
Planning educational training programs, including leadership programs, to implement with an adult audience; includes needs assessment, instructional design, lesson plan development, evaluation and other items related to leading adults.
Prerequisites: ALED or USAL-LED majors only; ALED 340, junior or senior classification.

ALED 440 Leading Change
Credits 3. 3 Lecture Hours.
Analysis of change models and theories and the leadership application on individual, organizational and societal changes.
Prerequisite: ALED or USAL-LED major; junior or senior classification, ALED 202.

ALED 441 Agricultural Extension Organization and Methods
Credits 3. 3 Lecture Hours.
Cooperative extension in agriculture and home economics; development, objectives, organization, program building and methods of teaching.
Prerequisite: Junior or senior classification.
ALED 442 Professional Communications in Agriculture and Life Sciences
Credits 3. 3 Lecture Hours.
Technological communication theory; instructional and presentation models; teaching strategies; multimedia development.
Prerequisite: Junior or senior classification.

ALED 481 Seminar
Credits 3. 3 Lecture Hours.
Individual and team approaches to the review of leadership concepts and their application; observation and discussion of current leadership trends and issues.
Prerequisites: ALED or USAL-LED major; senior classification, ALED 301, ALED 340, ALED 440, ALED 424.

ALED 485 Directed Studies in Agricultural Leadership Development
Credits 1 to 4. 0 to 4 Lecture Hours. 1 to 4 Other Hours.
Directed individual study of selected problems in agricultural leadership and development with emphasis on collection, analysis and presentation of information.
Prerequisites: Junior or senior classification and approval of instructor.

ALED 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Special topics in an identified area of agricultural development. May be repeated for credit.
Prerequisite: Junior or senior classification.

ALED 491 Research
Credits 1 to 4. 1 to 4 Lecture Hours.
Research conducted under the direction of faculty member in agricultural development. May be repeated 2 times for credit. Registration in multiple sections of this course are possible within a given semester provided that the per semester credit hour limit is not exceeded. Please see academic advisor in department.
Prerequisites: Junior or senior classification and approval of instructor.

ALED 494 Internship
Credits 1 to 6. 1 to 6 Other Hours.
Supervised internship and independent study related to student’s professional interest.
Prerequisites: ALED 301; junior or senior classification; 2.0 GPR; approval of instructor.

ANSC - Animal Science

Courses
ANSC 107 General Animal Science
Credits 3. 3 Lecture Hours.
(AGRI 1319, 1419*) General Animal Science. Scientific animal agriculture; selection, reproduction, nutrition, management and marketing of beef, cattle, swine, sheep, goats and horses; evaluation and processing of meat, wool and mohair. Importance of livestock and meat industries.
Prerequisite: Concurrent registration in ANSC 108 required.

ANSC 108 General Animal Science
Credit 1. 2 Lab Hours.
(AGRI 1419) General Animal Science. Laboratory to accompany ANSC 107.
Prerequisite: Concurrent registration in ANSC 107 required.

ANSC 117 Texas Barbecue
Credit 1. 1 Lecture Hour.
Survey, demonstration and participation in preparation techniques of Texas barbecue; comparison of regional and international barbecue methods.
Prerequisite: First year students.

ANSC 201 Introductory Equine Care and Use
Credits 2. 2 Lecture Hours.
Survey of basic equine care and use; breeds of horses and their use; care and maintenance of equines including feeding, health care, housing and equipment.

ANSC 207 Art and Heritage of Livestock
Credits 3. 3 Lecture Hours.
Using art as a venue to understand the legacy and heritage of livestock production and livestock’s contribution to civilization and society; from man as hunter, agriculturalist, and finally, as industrialist; from cave paintings to Russell and Remington; history of the effects of painting, poetry, architecture and sculpture on agriculture.

ANSC 210 Companion Animal Science
Credits 3. 3 Lecture Hours.
Types, care, physiology, common diseases and common treatments of companion animals (dogs, cats, exotic pets); careers including biomedical research; solutions for problems such as behavior and overpopulation.
Prerequisite: ANSC 107.

ANSC 221 Equine Handling and Safety.
(2-2). Credit 3
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Working around horses safely and effectively; includes equine behavior, proper handling techniques, controlling movement of horses, health assessment and basic management.
Prerequisite: ANSC 201.

ANSC 230 Animal and Research Experience
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Hands-on experience with farm animals; development and understanding of the scientific method; demonstration of critical thinking skills to evaluate scientific information.

ANSC 242 Growth and Development of Livestock
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Evaluation of slaughter livestock as related to growth and development, production efficiency, carcass value; selection of breeding animals based on performance, production records, visual appraisal; principles of growth biology; biotechnological tools used to manage growth and development.
Prerequisites: ANSC 107 and ANSC 108.

ANSC 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 1 to 4 Lab Hours.
Special Topics in... Selected topics in an identified area of animal science. May be repeated for credit.
Prerequisite: Approval of instructor.

ANSC 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in animal science. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor; 2.0 GPR in major and overall.

ANSC 302 Basic Beef Cattle Production
Credits 3. 3 Lecture Hours.
Fundamental concepts of beef management and production principles. Service course recommended for non-animal science majors.
Prerequisites: ANSC 107 and ANSC 108.
ANSC 303/NUTR 303 Principles of Animal Nutrition
Credits 3. 3 Lecture Hours.
Scientific approach to nutritional roles of water, carbohydrates, proteins, lipids, minerals, vitamins, and other dietary components; emphasis on the comparative aspects of gastrointestinal tracts and on digestion, absorption, and metabolism of nutrients.
Prerequisites: ANSC 107 and ANSC 108; CHEM 222 or CHEM 227 or equivalent.
Cross Listing: NUTR 303/ANSC 303.

ANSC 305 Animal Breeding
Credits 3. 2 Lecture Hours. 2 Lab Hours.
A systems approach to selection and mating of livestock; gene frequency, heritability, relationship, inbreeding, linebreeding, heterosis, crossbreeding, direct and correlated response to selection, and use of pedigree, family, progeny testing and indices for selection.
Prerequisites: ANSC 107 and ANSC 108; GENE 301; STAT 301.

ANSC 307/FSTC 307 Meats
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Integrated studies of the meat animal processing sequence regarding the production of meat-type animals and the science and technology of their conversion to human food.
Prerequisites: ANSC 107 and ANSC 108.

ANSC 309 Applied Animal Record Keeping
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Keeping, analyzing and interpreting records to make fully-informed decisions on a day-to-day basis for production and management scenarios; practical application unique to animal science and meat processing.
Prerequisite: Junior or senior classification.

ANSC 310 Behavior and Management of Domestic Animals
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Application of behavior of cattle, horses, sheep, goats and swine to their management; basic principles, physiology of behavior, perception, training, predators, use of dogs in livestock production, stress and animal welfare.
Prerequisites: ANSC 107 and ANSC 108.

ANSC 315 Livestock Judging
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Selection and evaluation of beef cattle, swine, sheep and horses. Ability to present accurate, clear and concise oral and written reasons stressed.
Prerequisites: ANSC 107 and ANSC 108; junior or senior classification.

ANSC 316 Equine Selection and Judging
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Detailed evaluation and comparison of horses; selection and critique of athleticism and performance in horses; industry trends addressed; oral and written defense of judgments also explained and expected; a prerequisite for participation on the Horse Judging Team. Prerequisite: Junior or senior classification or approval of instructor.

ANSC 317 Meat Selection, Evaluation and Grading
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Selection and grading of carcasses and wholesale cuts of beef, pork and lamb; principles of evaluation included in carcass contests and property testing.
Prerequisites: ANSC 107 and ANSC 108.

ANSC 318 Feeds and Feeding
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Characteristics of feedstuffs used in livestock enterprises; manual and computer ration formulation procedures and life cycle nutritional management of beef, swine, sheep, dairy, horses, fish and pets; methods of grain, protein supplement and forage processing and evaluation; commercial and on-the-farm feed mixing methods and feed control laws.
Prerequisite: ANSC 303/NUTR 303.

ANSC 320 Animal Nutrition and Feeding
Credits 3. 3 Lecture Hours.
Nutritional functions of water, protein, carbohydrates, fats, minerals and vitamins and their digestion, absorption, use and excretion; energy, protein and forage feedstuff characteristics and processing; nutritional requirements, ration formulation and feeding methods for farm animals; general course for non-animal science majors.
Prerequisite: Junior or senior classification or approval of instructor; restricted to students in the college of agriculture and life sciences.

ANSC 325 Advanced Livestock and Product Evaluation. (1-3). Credit 2
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Advanced evaluation of cattle, swine, sheep and equine; products produced or associated with each species; advanced oral or written defense of judgments associated with changing trends in these industries.
Prerequisite: Junior or senior classification.

ANSC 335 Purebred Beef Cattle Management
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Information and skills needed to be successful in the production, management and merchandising of purebred beef cattle; purpose and organization of the purebred beef cattle industry, and career opportunities in the industry.
Prerequisite: Junior or senior classification.

ANSC 337 Meat Merchandising
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Steps of meat processing and merchandising of retail and foodservice; merchandising practices such as selection, identification, fabrication, pricing, packaging and distribution.
Prerequisites: ANSC 307/FSTC 307; junior or senior classification.
ANSC 402 Exploring Animal Industries
Credits 2. 2 Lecture Hours.
Instruction for students nearing the end of their undergraduate studies; theoretical understanding of organizations and human resources available to students; awareness and understanding of the job application process, resume and cover letter writing; networking, professional and business attire; ethics related to job searches and retention.
Prerequisite: Junior or senior classification.

ANSC 406 Beef Cattle Production and Management
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Basic principles and methods of application involved in breeding, feeding, management, marketing and disease control in cow-calf production.
Prerequisites: ANSC 303/NUTR 303, ANSC 318, ANSC 433; junior or senior classification.

ANSC 408 Management of Stocker and Feedlot Cattle
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Basic principles involved in feeding, management, marketing and disease control of stocker and feeder cattle from weaning through slaughter for economical production of beef.
Prerequisites: ANSC 318; junior or senior classification.

ANSC 411 Equine Nutrition and Health
Credits 3. 3 Lecture Hours.
Designed to provide knowledge of nutrition and health in the horse; gastrointestinal anatomy, nutrient utilization, feeding management and nutritional requirements; metabolic diseases, infectious diseases, internal and external parasites, and herd health management.
Prerequisite: Junior or senior classification.

ANSC 412 Swine Production and Management
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Basic principles and their practical application in efficient, economical pork production; all areas of production--breeding and selection, nutrition, housing and equipment, marketing, herd health and economic management.
Prerequisites: Junior or senior classification or approval of instructor.

ANSC 414 Sheep and Goat Production and Management
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Application of basic principles of genetics, physiology and nutrition to practical sheep and angora goat production systems; management, health care and marketing of animals and fiber.
Prerequisites: Junior or senior classification or approval of instructor.

ANSC 415 Brazil: Comparative Ruminant Production
Credits 3. 3 Lecture Hours.
Contrast two scenarios of ruminant production in Brazil; the effects of globalization on the two different production systems.
Prerequisites: ANSC 303/NUTR 303 or ANSC 320 or approval of instructor.

ANSC 418 Equine Exercise Physiology. (2-2). Credit 3
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Changes within the systems of the horse resulting from the physical stresses of exercise, adaptations of systems in response to a training regimen; methodology for measuring improvement in physical condition; foundation for development of training programs for horses in moderate, intense or prolonged performance activities.
Prerequisites: Junior or senior classification and approval of instructor.

ANSC 419 Equine Reproduction. (3-0). Credit 3
Credits 3. 3 Lecture Hours.
Reproductive anatomy of the stallion and mare; industry and scientific practices; comprehensive analysis of the body of scientific research; development of critical thinking ability to assess and discuss previous research in comparison of needed research.
Prerequisites: ANSC 201 and junior or senior classification or approval of instructor.

ANSC 420 Equine Production and Management
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Application of biological and biotechnological principles and concepts in areas including genetics, breeding, nutrition, reproduction, immunology, parasitology, anatomy and exercise physiology to efficient production of horses for market; management of equine enterprises.
Prerequisites: ANSC 201 and ANSC 433; junior or senior classification.

ANSC 421 Stock Horse Advanced Training
Credits 3. 3 Lecture Hours. 2 Lab Hours.
Theory and practice of applying scientific principles of psychology and behavior modification to advanced training of the stock horse; exercise conditioning and humane training methods to maximize learning effectiveness; current industry trends for preparing horses and showing in stock horse events.
Prerequisites: ANSC 311 and previous riding experience.

ANSC 423 Issues in the Equine Industry
Credits 3. 3 Lecture Hours.
Integration of cumulative knowledge acquired in the equine science curriculum to demonstrate critical thinking and communication skills to address critical issues in the equine industry.
Prerequisites: Junior or senior classification; approval of instructor.

ANSC 424 Equine Sales Management. (3-0). Credit 3
Credits 3. 3 Lecture Hours.
Hands-on horse sale management experience through planning and conducting the Texas A&M University Department of Animal Science Horse Sale.
Prerequisite: Junior or senior classification and approval of instructor.

ANSC 431 Equine Marketing and Development
Credits 3. 3 Lecture Hours.
Scope of domestic and international equine industry; safe handling and transport of horses for export or import; career opportunities in the equine field.
Prerequisite: Junior or senior classification or approval of instructor.

ANSC 433 Reproduction in Farm Animals
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Physiological principles of reproductive processes in cattle, sheep, swine and horses including sperm and ova production, estrus, fertilization, gestation and parturition; techniques of semen evaluation and storage, estrous synchronization, embryo transfer and pregnancy determination.
Prerequisite: Junior classification.

ANSC 434 Animal Reproduction Management
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Available and emerging technologies; strategies including artificial insemination, embryo manipulation and transfer, control of ovulation, sex ratio manipulation and animal cloning for managing the reproductive function of farm animals; hands-on sessions using available technologies including artificial insemination of cattle.
Prerequisite: ANSC 433, priority enrollment given to graduating seniors in animal science.
ANSC 436 Texas Panhandle Beef Production Tour
Credits 2. 2 Lecture Hours.
Facets of beef production from cow/calf operations to retail product; experiential knowledge of technologies and practices to enhance efficiency to enlighten students regarding the array of career opportunities in the beef production industry.
Prerequisites: Junior or senior classification or approval of instructor.

ANSC 437 Marketing and Grading of Livestock and Meats
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Study of USDA livestock and carcass grades; understanding current market trends for beef, pork, lamb and goat; review of branded and certified programs; principles applied in contracting, breakeven determination, hedging, and grid or formula pricing.
Prerequisite: Junior or senior classification.

ANSC 439 Feedlot Risk Management
Credits 2. 2 Lecture Hours.
Advanced study of livestock marketing techniques; cash sales, video sales, futures and options markets, forward contracting; problem solving in real-time livestock marketing situations; risk of ownership of hypothetical livestock operations.
Prerequisites: Junior or senior classification or approval of instructor.

ANSC 447 Advanced Meat Science and Technology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Advanced basic and applied studies of meat science and/or technology utilizing the underlying physiological and structural components for conversion to human food; understanding the influence of pre- and post-harvest factors on meat quality, composition, color, packaging, sensory and preparation factors; applying scientific and business principles to manufacturing and process flow of commercial meat food products and demonstrating knowledge of these principles through development of meat products.
Prerequisites: ANSC 307/FSTC 307; CHEM 222 or approval of instructor; junior or senior classification.

ANSC 457/FSTC 457 Hazard Analysis and Critical Control Point System
Credits 3. 3 Lecture Hours.
Hazard Analysis and Critical Control Point (HACCP) principles specifically related to meat and poultry; microbiological and process overviews; good manufacturing practices and standard operating procedures development.
Prerequisite: FSTC 326/DASC 326 or approval of instructor.
Cross Listing: FSTC 457/ANSC 457.

ANSC 481 Seminar
Credit 1. 1 Lecture Hour.
Review of literature and research problems related to the livestock and food industries; preparation of a technical report including an oral presentation supported by a written technical paper.
Prerequisite: Senior classification.

ANSC 484 Livestock Practicum
Credit 1. 2 Other Hours.
Provides an opportunity to learn skills required in livestock production; planned for students who have had limited farm and ranch experience in one or more species.
Prerequisite: Junior or senior classification in animal science or approval of instructor.

ANSC 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed individual study of selected problem in field of animal science.
Prerequisites: Junior or senior classification; written approval of professor supervising the activity; 2.0 GPR in major and overall.

ANSC 487/FSTC 487 Sensory Evaluation of Foods
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Application of sensory science principles and practices to food systems including an understanding of discriminative, descriptive and consumer sensory techniques.
Prerequisites: CHEM 222 or CHEM 227; junior or senior classification.
Cross Listing: FSTC 487/ANSC 487.

ANSC 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 8 Lab Hours.
Selected topics in an identified area of animal science. May be repeated for credit.
Prerequisite: Junior or senior classification.

ANSC 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in animal science. May be repeated 3 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisite: Junior or senior classification and approval of instructor; 2.0 GPR in major and overall.

ANSC 494 Animal Science Internship
Credits 1 to 5. 1 to 5 Other Hours.
Independent study and supervised field experience related to the student's professional interest.
Prerequisites: Junior or senior classification or approval of instructor; 2.0 GPR in major and overall.

ANSC 601/NUTR 601 General Animal Nutrition
Credits 3. 3 Lecture Hours.
Comparative nutrition of animal species contrasting digestive, metabolic and physiological functions involved in processing and using nutrients.
Prerequisite: ANSC 303/NUTR 303 or ANSC 318 or equivalent.
Cross Listing: NUTR 601/ANSC 601.

ANSC 602/NUTR 602 Energetics of Metabolism and Growth
Credits 3. 3 Lecture Hours.
Current fundamental concepts in protein and energy metabolism relating to nutrients required for maintenance, growth and development of animals.
Prerequisite: BICH 410 or approval of department head.
Cross Listing: NUTR 602/ANSC 602.

ANSC 604 Ruminant Nutrition
Credits 3. 3 Lecture Hours.
Current concepts in anatomy, physiology of digestion and metabolism in ruminant nutrition and their relationships to nutrition practice and research with emphasis on ruminants.
Prerequisites: ANSC 601/NUTR 601 or ANSC 602/NUTR 602; BICH 411 or BICH 603 and/or approval of department head.

ANSC 605 Advancements in Beef Cattle Production
Credits 3. 3 Lecture Hours.
Current knowledge and concepts in production of lean beef; review of research in beef cattle production, breeding, nutrition, reproduction and economics.
Prerequisites: ANSC 305, ANSC 318 and ANSC 406 or approval of department head.
ANSC 607/FSTC 607 Physiology and Biochemistry of Muscle as a Food
Credits 3.3 Lecture Hours.
Biochemical, histological, anatomical and physical characteristics of muscle cells and factors associated with transformation of muscle cells into meat.
Prerequisite: BICH 410 or approval of department head.
Cross Listing: FSTC 607/ANSC 607.

ANSC 608 Beef Cattle Management
Credits 3.3 Lecture Hours.
Current knowledge of beef cattle ranch and feedlot production systems; nutrition, management, breeding, body composition, economics, health, pollution and sanitation control.
Prerequisite: ANSC 406 or ANSC 408.

ANSC 609 Physiology of Growth and Stress in Livestock
Credits 3.3 Lecture Hours.
Basic biochemical, physiological and endocrine mechanisms involved in processes regulating metabolism, growth and stress in livestock; current research and management principles/concepts useful to study growth and stress physiology; anabolic agents, anti-stress agents, immunoneutralization; transgenic livestock.
Prerequisites: BICH 410 and BICH 411 or approval of instructor.

ANSC 610 Applied Animal Ethology
Credits 3.2 Lecture Hours. 2 Lab Hours.
Review and evaluation of ethological research and principles as they relate to the management of animals; research principles and techniques used in studying animal behavior; psychological and physiological aspects of stress; topics of interest to students; visits to laboratories of researchers studying aspects of animal behavior/ethology.

ANSC 611 Equine Nutrition
Credits 3.3 Lecture Hours.
Review and evaluation of current research in equine nutrition; principles of digestive physiology and nutrition unique to equine species; comparative digestion; integration of scientific principles into feeding management systems to enhance productivity, health and longevity of the equine.
Prerequisite: ANSC 601/NUTR 601 or approval of department head.

ANSC 612 Equine Reproduction
Credits 3.3 Lecture Hours.
Review of current research relating to equine reproductive physiology and endocrinology; concepts from current research in equine reproduction to develop integrated reproductive management systems for horses.
Prerequisites: ANSC 433; graduate classification.

ANSC 613/NUTR 613 Protein Metabolism
Credits 3.3 Lecture Hours.
Basic concepts and recent advances in protein metabolism in animals with emphasis on physiological and nutritional significances; discussion of protein digestion; absorption of peptides; absorption, synthesis and degradation of amino acids; hormonal and nutritional regulation of protein turnover; determination of protein quality and requirements.
Prerequisite: BICH 411 or BICH 601 or equivalent or approval of instructor.
Cross Listing: NUTR 613/ANSC 613.

ANSC 614/GENE 614 Maximum Likelihood Estimation of Genetics
Credits 3.3 Lecture Hours.
Theoretical and analytical approaches to the application of maximum likelihood for the estimation of parameters under linear and nonlinear models; single and polygene genetic models including Hardy-Weinberg equilibrium, linkage analysis and quantitative trait loci detection.
Prerequisites: GENE 603; STAT 651 and STAT 652 or STAT 601.
Cross Listing: GENE 614/ANSC 614.

ANSC 615 Brazil: Comparative Ruminant Animal Nutrition
Credits 3.3 Lecture Hours.
Contrast two scenarios of ruminant production in Brazil; the effects of globalization on the two different production systems.
Prerequisites: ANSC 603 or ANSC 604, or approval of instructor.

ANSC 616 Equine Exercise Science
Credits 3.3 Lecture Hours.
Review and evaluation of current research in equine exercise science; physical, physiologic and metabolic adaptation to physical training in the horse; bioenergetics; nutritional requirements; problems in the hard-working horse; management and training approaches to delay fatigue in race/performance horses.
Prerequisites: GENE 420; BICH 411; graduate classification.

ANSC 617/NUTR 617 Experimental Techniques in Meat Science
Credits 3.1 Lecture Hour. 6 Lab Hours.
Methods used in separating and identifying muscle proteins and fats; techniques for determining postmortem changes of muscle tissue as a result of antemortem treatments.
Prerequisites: ANSC 607/FSTC 607; BICH 411.
Cross Listing: NUTR 617/ANSC 617.

ANSC 618/NUTR 618 Lipids and Lipid Metabolism
Credits 3.3 Lecture Hours.
Chemical nature of various classes of lipids and lipid-derived hormones; absorption and metabolism of fatty-acids and lipids; regulation of lipid biosynthesis and obesity; relationship between lipid metabolism and cholesterol homeostasis; lipids as hormones.
Prerequisite: BICH 410 or approval of instructor.
Cross Listing: NUTR 618/ANSC 618.

ANSC 619 Physiological Chemistry of Livestock Species
Credits 3.3 Lecture Hours.
Integration of biochemical concepts with physiological chemistry and intermediary metabolism of livestock species; unique aspects of absorption and cellular metabolism of carbohydrates, lipids and proteins in livestock species; regulation of cellular nutrient metabolism in livestock species.
Prerequisite: BICH 410 or approval of instructor.

ANSC 621 Issues in the Equine Industry
Credits 3.3 Lecture Hours.
Integration of cumulative knowledge acquired in the equine science curriculum to demonstrate critical thinking and communication skills to address critical issues in the equine industry.
Prerequisite: Approval of instructor or enrollment in master of equine industry management program.
ANSC 622 Research Methods in Animal Science  
Credits 2. 2 Lecture Hours.  
Development of the conceptual framework of research; study of software programs for data recording, management, and analysis; evaluation of specific experimental designs historically used in animal experiments; discussion of interpretations found in peer-reviewed research publications; data presentation for scientific meetings and publication; the peer review process and publication in technical journals.  
Prerequisite: STAT 651; or STAT 652.

ANSC 623/POSC 625 Precision Diet Formulation  
Credits 3. 3 Lecture Hours. 2 Lab Hours.  
Theoretical and applied principles associated with precision feeding and diet formulation to optimize nutrient requirements; optimization using least-cost formulation, ingredient inventory, farm and feed mill management, and nutrient management of non-ruminants (poultry, swine, horse, and fish) and ruminant animals (beef and dairy).  
Prerequisite: POSC 411 or ANSC 318.  
Cross Listing: POSC 625/ANSC 623.

ANSC 624 Mammalian Developmental Genetics  
Credits 3. 3 Lecture Hours.  
Genetic control of developmental pathways responsible for pattern formation and morphogenesis in mammals; genetic networks and genome organization; significance of genetic regulatory networks as a source of evolutionary diversity.  
Prerequisites: GENE 301 or GENE 320/BIMS 320; BICH 410/411 or equivalent.

ANSC 626/GENE 626 Analyses of Gene Expression  
Credits 2. 1 Lecture Hour. 3 Lab Hours.  
Proficiency in handling DNA and RNA gained during exercises used routinely in analyses of gene expression; RNA preparation and analysis on Northern blots; in vitro transcription and polyacrylamide gel analysis of nucleic acids; sub-cloning and mRNA quantitation using polymerase chain reaction.  
Prerequisite: GENE 450 or approval of instructor; radiation safety training.  
Cross Listing: GENE 626/ANSC 626.

ANSC 627 Carcass Composition and Quality  
Credits 3. 3 Lecture Hours.  
Survey of scientific literature regarding carcass composition; quality and palatability of meat animals; factors that affect differences among animals of the same specie; impact on value and usefulness.  
Prerequisite: Graduate classification.

ANSC 628 Animal Breeding  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Concepts from Mendelian, population and quantitative genetics; heritability, selection response, selection criteria, selection index, genetic relationship, inbreeding, mating systems, hybrid vigor and genetic-environmental interaction applied to livestock breeding and to production systems; interactions between genetics and nutrition, reproduction, production and management for both established concepts and recent trends emphasized according to special interests of students.  
Prerequisite: ANSC 305 or POSC 414.

ANSC 629 Applied Animal Genomics  
Credits 3. 3 Lecture Hours.  
Theory and application of genomics by livestock industries; consideration of genetic markers, gene mapping methods, genome analysis and emerging technologies such as microarrays, transgenesis, cloning and marker assisted selection; exposure to bioinformatic tools for genomics.  
Prerequisite: GENE 603.  
Cross Listing: GENE 629 and POSC 630.

ANSC 630 Reproductive Biology I  
Credits 4. 4 Lecture Hours.  
Embryological, physiological, hormonal, cellular and molecular mechanisms involving the endocrine and reproductive systems of mammals; emphasis on domestic livestock, rodents and humans; current theories evaluated and discussed using information from recent scientific publications.  
Prerequisites: ANSC 433; BICH 411 or equivalent.

ANSC 631 Reproductive Biology II  
Credits 4. 4 Lecture Hours.  
Embryological, physiological, hormonal, cellular and molecular mechanisms involving the endocrine and reproductive systems of mammals; emphasis on domestic livestock, rodents and humans; current theories evaluated and discussed using information from recent scientific publications.  
Prerequisite: ANSC 630 or approval of instructor.

ANSC 633 Concepts in Reproduction  
Credits 3. 3 Lecture Hours.  
Concepts from current research in physiology of reproduction evaluated and applied for enhancement of livestock production efficiency; ovulation control, embryo transfer, multiple births and control of parturition.  
Prerequisite: ANSC 433 or equivalent or approval of department head.

ANSC 636 Texas Panhandle Beef Production Tour  
Credits 2. 2 Lecture Hours.  
Covers all facets of beef production from cow/calf operation to retail product; experiential knowledge of technologies and practices to enhance efficiency; enlightens the array of career opportunities in the beef production industry.  
Prerequisite: Approval of instructor.

ANSC 637 Food Safety: Policy, Regulations and Issues  
Credits 3. 2 Lecture Hours. 1 Lab Hour.  
Designed to explore the complexities of the regulations governing the production of foods of animal origin in the United States; requirements for countries importing products into the United States; federal, state and local requirement will be addressed.  
Prerequisites: ANSC/FSTC 457/ANSC 457/657 or approval of instructor.

ANSC 638/GENE 638 Prediction of Genetic Merit  
Credits 3. 3 Lecture Hours.  
Mixed linear models and best linear unbiased prediction for genetic evaluation.  
Prerequisite: GENE 613.  
Cross Listing: GENE 638/ANSC 638.

ANSC 647/FSTC 647 Technology of Meat Processing and Distribution  
Credits 3. 3 Lecture Hours.  
Quantitative and qualitative characteristics of meat and meat products as related to food technology processing operations; manufacturing, preservation, packaging and merchandising.  
Cross Listing: FSTC 647/ANSC 647.
ANSC 657/FSTC 657 Hazard Analysis and Critical Control Point System
Credits 3. 3 Lecture Hours.
Examination of the Hazard Analysis and Critical Control Point (HACCP) principles specifically related to meat and poultry; microbiological and process overviews; good manufacturing practices (GMP) and standard operating procedures (SOP) development; team-building and implementation into industry operations. This class is designed for the production of food and fulfills the training requirements of USDA's HACCP regulation for meat and poultry (9 CFR Part 417), and FDA's HACCP regulations for fish and fishery products (21 CFR Part 123 and 1240) and for juice (21 CFR Part 120).
Cross Listing: FSTC 657/ANSC 657.

ANSC 667/FSTC 667 Industrial Processed Meat Operations
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Application of scientific principles and business practices to manufactured meat products; interrelationships among marketing, manufacturing, product development, regulatory compliance and quality assurance in commercial processed meat operations.
Prerequisite: Approval of instructor.
Cross Listing: FSTC 667/ANSC 667.

ANSC 681 Seminar
Credit 1. 1 Lecture Hour.
Important current developments in field of animal science; review of current literature and presentation of papers on selected animal science topics.
Prerequisite: Graduate classification in animal science.

ANSC 684 Professional Internship
Credits 1 to 16. 1 to 16 Other Hours.
Experience in the application of formal training to a commercial operation under supervision of the operations manager and a designated faculty member. The student will investigate a matter of mutual interest to the enterprise manager and to Texas A&M University; will collect, analyze and interpret the data and report the results in a professional paper approved by his or her graduate committee.

ANSC 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Advanced studies in animal science problems and procedures. Problems assigned according to experience, interest and needs of individual student.
Prerequisite: Approval of department head.

ANSC 687/FSTC 687 Sensory Evaluation of Foods
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Application of sensory science principles and practices to food systems including an understanding of discriminative, descriptive and consumer sensory techniques.
Prerequisite: CHEM 222 or CHEM 228.
Cross Listing: FSTC 687/ANSC 687.

ANSC 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Special topics in an identified area of animal science. May be repeated for credit.
Prerequisite: Approval of department head.

ANSC 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Investigations leading to student's thesis or dissertation in fields of animal production, meats, wool and mohair, nutrition, inheritance of farm animals and physiology of reproduction.

ANSC 697/FSTC 697 Applied Microbiology for Foods of Animal Origin: Processing, Sanitation and Sanitary Design
Credits 3. 3 Lecture Hours.
Application of basic food microbiology knowledge and principles to food production processes and products: sources of microbiological contamination and their impact on food safety and spoilage; application of sanitary design and validation; testing and auditing to monitor and troubleshoot the process.
Prerequisites: DASC 326/FSTC 326, FSTC 326/DASC 326 or FSTC 606/DASC 606 or equivalent.
Cross Listing: FSTC 697/ANSC 697.

ANTH - Anthropology

Courses

ANTH 201 Introduction to Anthropology
Credits 3. 3 Lecture Hours.
(ANTH 2346, HUMA 2323) Introduction to Anthropology. An introduction to the discipline of anthropology through the examination of its four subfields: archaeology, physical anthropology, sociocultural anthropology and linguistics.

ANTH 202 Introduction to Archaeology
Credits 3. 3 Lecture Hours.
(ANTH 2302) Introduction to Archaeology. An introduction to the study of the human past through the retrieval, analysis, and interpretation of material remains.

ANTH 204 Peoples and Cultures of the Ancient World
Credits 3. 3 Lecture Hours.
Explores the development of human societies and world prehistory from the beginnings of humanity more than two million years ago to emergence of complex civilizations.

ANTH 205 Peoples and Cultures of the World
Credits 3. 3 Lecture Hours.
Survey of human cultures around the world using case studies of customs and cultural organization; case studies exemplifying contrasting types of cultures and societies.

ANTH 210 Social and Cultural Anthropology
Credits 3. 3 Lecture Hours.
(ANTH 2351) Social and Cultural Anthropology. Evolution of cultures; differences, similarities and effects of material and non-material culture on economic, social and political organization.

ANTH 225 Introduction to Biological Anthropology
Credits 3. 3 Lecture Hours. 0 Lab Hours.
Study of human biology including an examination of evolutionary processes acting on human populations; human genetics; non-human primate anatomy, classification and ecology of primates; the primate paleontological record, and human variation and adaptation. Concurrent registration in ANTH 226 recommended.

ANTH 226 Introduction to Biological Anthropology Laboratory
Credit 1. 0 Lecture Hours. 3 Lab Hours.
Exploration of basic evolutionary principles through population genetics; hands-on exposure to the fossils of primate and human evolution along with opportunity to measure, compare, contrast and observe trends that have occurred throughout the Cenozoic era. Concurrent registration in ANTH 225 is recommended.
ANTH 229 Introduction to Folklore
Credits 3. 3 Lecture Hours.
Study of folklore through selected examples of traditional cultures, their beliefs, customs and art forms such as: tales, folksongs, proverbs, riddles and material culture.

ANTH 285 Directed Studies
Credits 0 to 3. 0 to 3 Other Hours.
For individual research in anthropology on subjects not included in established courses. May be taken two times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

ANTH 289 Special Topics In...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of anthropology. May be repeated for credit.

ANTH 291 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the direction of a faculty member in Anthropology. May be taken two times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

ANTH 300 Cultural Change and Development
Credits 3. 3 Lecture Hours.
Anthropological strategies for the study of cultural change and the implication of these strategies for the development of Western and non-Western societies.

ANTH 301 Indians of North America
Credits 3. 3 Lecture Hours.
Native North American cultures from the Arctic to Mesoamerica; their origins, cultures prior to extensive acculturation and their contemporary situations.

ANTH 302 Archaeology of North America
Credits 3. 3 Lecture Hours.
Overview of archaeology and prehistory of North America from the arrival of humankind through the development of agriculture to Euro-American contact.
Prerequisite: ANTH 201, ANTH 202, ANTH 205 or ANTH 210.

ANTH 303 Archaeology of the American Southwest
Credits 3. 3 Lecture Hours.
Overview of archaeology and prehistory of the southwestern United States and northern Mexico from the earliest evidence of human occupation to the Spanish conquest.
Prerequisite: ANTH 201, ANTH 202, ANTH 205 or ANTH 210.

ANTH 305 Fundamentals of Anthropological Writing
Credit 1. 1 Lecture Hour.
Basic types of writing expected of anthropology students; emphasis on the subject matter of an upper-division anthropology course in which the student is currently enrolled.
Prerequisites: Junior or senior classification and co-enrollment in another upper-division anthropology course (the "companion course").

ANTH 308 Archaeology of Mesoamerica
Credits 3. 3 Lecture Hours.
Development of Indian civilizations in Mexico and Guatemala, including prehistory of the Olmec, Maya, Aztec and other regional cultures to the time of the Spanish conquest.

ANTH 312 Fossil Evidence of Human Evolution
Credits 3. 3 Lecture Hours.
Detailed review of fossil antecedents of humans including theoretical implications for an understanding of human evolution.
Prerequisite: ANTH 225 or approval of instructor.

ANTH 313 Historical Archaeology
Credits 3. 3 Lecture Hours.
Use and methods of historical archaeology in locating, documenting, restoring and preserving our historical resources.

ANTH 314 Agrarian Peasant Societies
Credits 3. 3 Lecture Hours.
Major adaptations among traditional agricultural peoples of the world; production and marketing organization; culture of the village; ties between peasants and the nation; contemporary changes in traditional life.

ANTH 316 Nautical Archaeology
Credits 3. 3 Lecture Hours.
Nautical Archaeology Underwater shipwrecks, sunken harbors, and other submerged evidence of human activities; relationship to cultural geography in general; problems of diving technology, surveying and preservation; relevance to modern problems.
Prerequisite: Junior or senior classification.

ANTH 317/RELS 317 Introduction to Biblical Archaeology
Credits 3. 3 Lecture Hours.
Application of archaeology in biblical research; basic overview of the material cultures that are the setting for the biblical narratives.
Cross Listing: RELS 317/ANTH 317.

ANTH 318 Nautical Archaeology of the Americas
Credits 3. 3 Lecture Hours.
Seafaring in the Americas from the 16th to the 20th centuries based on shipwreck archaeology; ship construction, exploration, commerce, naval warfare and related activity; influence of seafaring on the cultures, economics and history of the Western Hemisphere.

ANTH 322 Nautical Archaeology of the Mediterranean
Credits 3. 3 Lecture Hours.
The archaeology of ancient seafaring in the Mediterranean from the Stone Age through the Roman Empire.
Prerequisite: Junior or senior classification.

ANTH 324/MUSC 324 Music in World Cultures
Credits 3. 3 Lecture Hours.
Examination of music from an ethnomusicological perspective focusing on musical performance and the complex interrelationship of music to culture, society and daily life; examination of music from a variety of cultures through a series of case studies.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: MUSC 324/ANTH 324.

ANTH 330 Field Research in Anthropology
Credits 1 to 9. 1 to 9 Other Hours.
Training for students in formulating and solving anthropological problems through field research; problem oriented field research under supervision.
Prerequisites: 6 hours of anthropology; approval of instructor.

ANTH 335/ASIA 335 Cultures of Central Asia
Credits 3. 3 Lecture Hours.
Study of anthropological research in Central Asia: ecological adaptations; colonialism and post-colonialism; ethnic politics and ethnic conflict; religion and identity; gender and family; globalization and modernization.
Prerequisite: Junior or senior classification.
Cross Listing: ASIA 335/ANTH 335.
ANTH 340/RELS 340 Folklore and the Supernatural
Credits 3. 3 Lecture Hours.
Traditional expressions of the supernatural such as superstition, belief tale and divination classified as folklore genres and their relationships to the cultures in which they develop; theories drawn from anthropology, folklore and related social sciences. 
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: RELS 340/ANTH 340.

ANTH 350/ASIA 360 Archaeology of the Old World
Credits 3. 3 Lecture Hours.
Overview of archaeology and prehistory of Europe, Africa and Asia from the evolution of the hominids to the development of agriculture and the rise of civilization. 
Cross Listing: ASIA 360/ANTH 350.

ANTH 353/CLAS 353 Archaeology of Ancient Greece
Credits 3. 3 Lecture Hours.
Archaeology of ancient Greece from the Stone Age until the ascent of Rome in the Hellenistic Period; remains of ancient Greek art (sculpture, mosaic, painting), architecture (temples, homes, civic structures), religion (figurines, votive offerings), and social history (coins, inscriptions). 
Prerequisite: Junior or senior classification.
Cross Listing: CLAS 353/ANTH 353.

ANTH 354/CLAS 354 Archaeology of Ancient Italy
Credits 3. 3 Lecture Hours.
Archaeology of ancient Italy from the Stone Age until the collapse of the Roman Empire in the fourth century; remains of ancient Etruscan and Roman art (sculpture, mosaic, painting), architecture (temples, homes, civic structures), religion (figurines, votive offerings), and social history (coins, inscriptions). 
Prerequisite: Junior or senior classification.
Cross Listing: CLAS 354/ANTH 354.

ANTH 360 Ancient Civilizations of the World
Credits 3. 3 Lecture Hours.
Explores recent discoveries and efforts by archaeologists to understand the rise and fall of states and civilizations that emerged in the Near East, Africa, India, Europe, China, Mesoamerica, and Peru between 3500 BCE and 1500 CE. 
Prerequisite: Junior or senior classification.

ANTH 401 Ice Age Humans in North America
Credits 3. 3 Lecture Hours.
Archaeological, environmental and geological evidence related to the timing of human entry into the Americas and megafaunal extinctions at the end of the Pleistocene. 
Prerequisite: ANTH 202 or equivalent.

ANTH 402 Archaeological Artifact Conservation
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Analysis of the treatments for artifacts of clay, stone, glass, wood, shell, bone, fiber and metal from archaeological excavations or ethnographic, and historic collections presented in an integrated series of lectures and hands-on laboratory experience. 
Prerequisite: Junior or senior classification or approval of instructor.

ANTH 403/RELS 403 Anthropology of Religion
Credits 3. 3 Lecture Hours.
Anthropological approach to religion and to the relationship between religion, economics, politics and social structure with particular reference to non-Western, preindustrial societies. 
Cross Listing: RELS 403/ANTH 403.

ANTH 404/WGST 404 Women and Culture
Credits 3. 3 Lecture Hours.
Examines women's lives in evolutionary and cross-cultural perspective; women's roles in subsistence, politics, religion and economics in traditional cultures; women's roles in international development; the cultural and social construction of women's biology cross-culturally including circumcision, menstruation, pregnancy, childbirth and motherhood. 
Cross Listing: WGST 404/ANTH 404.

ANTH 405 Introduction to the Primates
Credits 3. 3 Lecture Hours.
Survey of nonhuman primates from ecological and evolutionary perspectives covering numerous topics including: taxonomy; primate evolution; behavioral observation; reproductive strategies; diet; and conservation. 
Prerequisite: Junior or senior classification.

ANTH 409 Science, Pseudoscience and Critical Thinking in Anthropology
Credits 3. 3 Lecture Hours.
Close scrutiny of fantastic claims made across a broad spectrum of media regarding anthropology, biological anthropology and archaeology; distinction of science from pseudoscience; critical evaluation of scientific and pseudoscientific research; evaluation of media portrayal of science; development of critical thinking skills for skeptical investigation of extraordinary claims. 
Prerequisite: Junior or senior classification or approval of instructor.

ANTH 410 Anthropological Theory
Credits 3. 3 Lecture Hours.
A systematic examination of the basic principles of anthropology. 
Prerequisite: ANTH 210.

ANTH 412 Archaeological Theory
Credits 3. 3 Lecture Hours.
History of scientific archaeological exploration; major theoretical paradigms and movements in archaeological theory; current trends in archaeology; intellectual developments from other disciplines that influenced archaeological thought. 
Prerequisites: Junior or senior classification, ANTH 202 or approval of instructor.

ANTH 415 Anthropological Writing
Credits 3. 3 Lecture Hours.
Reading and discussion of the classic genres of anthropological literature; instruction in writing styles and techniques appropriate to each genre, followed by guided writing assignments. 
Prerequisite: Junior or senior classification.

ANTH 417/CLAS 417 Naval Warfare and Warships in Ancient Greece and Rome. (3-0). Credit 3
Credits 3. 3 Lecture Hours.
Extensive survey of Greek and Roman warships, naval warfare, naval strategy and tactics drawn upon archaeological evidence, literary documentation and iconographic material, from the Bronze Age (Ancient Egypt and the mythical Trojan War) to the Imperial Roman Navy. 
Prerequisite: Junior or senior classification.
Cross Listing: CLAS 417/ANTH 417.

ANTH 418 Romans, Arabs, and Vikings--Seafaring in the Mediterranean during the early Christian Era
Credits 3. 3 Lecture Hours.
Examination of seafaring, maritime commerce, naval affairs, and shipbuilding in the Mediterranean from the late Roman Period until the fall of Constantinople in 1453. 
Prerequisite: Junior or senior classification.
ANTH 419 Indians of Texas
Credits 3. 3 Lecture Hours.
Study of diverse native/immigrant Texas Indian lifeways/cultures from late pre-European to contemporary times; exploration of historical underpinnings, traditional cultures, especially land-use patterns; assessment of tribal relationships with colonial powers, U.S., and Texas governments as evidenced in ethnographic, ethnohistoric, and historical materials; application toward anthropological, archaeological, and human ecology research.
Prerequisites: Junior or senior classification; ANTH 201; and ANTH 301 or ANTH 302 or ANTH 303 or HIST 258; or HIST 308 or approval of instructor.

ANTH 421 Museums and Their Functions
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Role of museums, those specializing in natural history and the extent to which they serve the community, state, nation, and the advancement of the sciences included in their programs; history, operations, methods and programs.
Prerequisite: Junior or senior classification.

ANTH 423 Bioarchaeology
Credits 3. 3 Lecture Hours.
Role of human skeletal studies in reconstructing the biological and cultural past of humans; evidence gleaned from human skeletal remains recovered from archaeological sites such as data regarding diet, health, genetics and migration.
Prerequisites: ANTH 225; junior or senior classification.

ANTH 424 Human Evolutionary Ecology I: Culture, Cooperation and Subsistence
Credits 3. 3 Lecture Hours.
Examines evolutionary perspective to explore culture, cooperation and sociality, and subsistence behaviors across a wide variety of human cultures; part of the Human Evolutionary Ecology series along with ANTH 434.

ANTH 425 Human Osteology
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Concepts and methods used by anthropologists to identify, describe and analyze human skeletal remains from forensic and archaeological contexts.
Prerequisites: ANTH 225 or VIBS 305; junior or senior classification.

ANTH 426 Anthropology of Food and Nutrition
Credits 3. 3 Lecture Hours.
Anthropological study of human foodways and their nutritional consequences; how environmental, biological and cultural factors interact to produce patterns of food intake, and the effects of such patterns on health, growth and fertility; examples drawn primarily from non-Western societies.
Prerequisite: ANTH 201 or ANTH 210 or ANTH 225 or NUTR 202 or approval of instructor.

ANTH 427 Human Variation
Credits 3. 3 Lecture Hours.
Biological basis of variation in the physical features of modern humans; details of anatomical and physiological differences of living populations to understand their adaptive and historical significance; history of human variation studies rooted in the historical notion of "race."
Prerequisites: ANTH 225, BIOL 214 or 225; junior or senior classification.

ANTH 430 Applied Anthropology
Credits 3. 3 Lecture Hours.
Theory, ethics and practical applications of anthropological methods and concepts as they relate to planned programs of sociocultural change.
Prerequisites: ANTH 210; junior or senior classification.

ANTH 434 Human Evolutionary Ecology II: Reproduction and Parenting
Credits 3. 3 Lecture Hours.
Evolutionary ecology perspective on family-formation patterns, sexuality, reproduction and parenting of humans throughout the life course and across different cultures; part of a Human Evolutionary Ecology series along with ANTH 424.
Prerequisites: Junior or senior classification; ANTH 201, ANTH 205, or ANTH 424.

ANTH 439/WGST 439 Gender, Ethnicity and Class in Archaeological Research
Credits 3. 3 Lecture Hours.
Exploration of theoretical and methodological issues in engendering archaeology; ideological biases in the interpretation of roles attributed to women, men, and underrepresented groups in the past; the impact of cultural transformation on underrepresented groups and gender relations; and the formulation of research questions concerning these issues.
Prerequisites: ANTH 202, ANTH 210, WGST 200 or WGST 207/SOCI 207; junior or senior classification or approval of instructor.
Cross Listing: WGST 439/ANTH 439.

ANTH 440 Studies in Globalization
Credits 3. 3 Lecture Hours.
Selected issues on the anthropology of globalization such as the impact of global circulations of media, money and people on local cultures, identities and politics, migration and political economy. May be taken three times for credit.
Prerequisites: Junior or senior classification or approval of instructor.

ANTH 444/CLAS 444 Classical Archaeology
Credits 3. 3 Lecture Hours.
History of the discipline through the individuals, organizations, excavations, theoretical models and ethical issues that have shaped it.
Prerequisites: Junior or senior classification; ANTH 353/CLAS 353, ANTH 354/CLAS 354, CLAS 353/CLAS 434, ANTH 353/CLAS 354, or CLAS 354/ANTH 354.
Cross Listing: CLAS 444/ANTH 444.

ANTH 445 Studies in African Diaspora
Credits 3. 3 Lecture Hours.
Examination of topics related to global African diaspora including African descent populations outside of Africa wherever found (the Americas, the Caribbean, Europe, Asia, etc.); construction of blackness in Latin America; diversity of past and present African descent populations in the Old World; social and political mobilization; religion; popular culture; cultural politics; politics of identity. May be taken three times for credit.
Prerequisite: Junior or senior classification.

ANTH 446 Ceramic Artifact Analysis
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Concepts, methods, and approaches used in the analysis of archaeological pottery with a focus on the techniques and theories used to bridge the gap between the recovery of ceramic artifacts and their interpretation within various anthropological contexts.
Prerequisite: ANTH 202 and approval of instructor; junior or senior classification.
ANTH 447 Lithic Artifact Analysis  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Laboratory-based course reviewing methods archaeologists use to analyze stone tools and debitage, including identification of tool-stone sources, reconstruction of technology, explanation of assemblage variability, and microscopic use-wear analysis.  
Prerequisite: ANTH 202 and approval of instructor; junior or senior classification.

ANTH 454 Archaeological Photography  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
How to better use cameras in the process of reporting archaeological sites and material culture by exploring old and new photographic technologies.  
Prerequisite: Junior or senior classification.

ANTH 461 Environmental Archaeology  
Credits 3. 3 Lecture Hours.  
Exploration of the paleoecological context in which past humans interacted with the natural environment encompassing plants, animals and landscape; advanced method, theory and applications in paleoenvironmental reconstruction.  
Prerequisites: ANTH 202 or approval of instructor; junior or senior classification.

ANTH 468 Anthropology Internship  
Credits 3. 3 Other Hours.  
Provides students with the opportunity to gain practical experience in a variety of settings, including local, state or federal agencies; museums; non-profit organizations; non-governmental organizations; private firms.  
Prerequisite: Junior or senior classification.

ANTH 485 Directed Studies  
Credits 0 to 9. 0 to 9 Other Hours.  
For individual research in anthropology on subjects not included in established courses.  
Prerequisite: Junior or senior classification or approval of instructor.

ANTH 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of anthropology. May be repeated for credit.

ANTH 491 Research  
Credits 0 to 3. 0 to 3 Other Hours.  
Research conducted under the direction of a faculty member in Anthropology. May be taken two times for credit.  
Prerequisites: Junior or senior classification and approval of instructor.

ANTH 601 Biological Anthropology  
Credits 3. 3 Lecture Hours.  
Survey of the field of biological anthropology covering the principles of evolution, human evolution, human adaptation, human variation, primate diversity and evolution, osteology and bioarchaeology.

ANTH 602 Archaeological Methods and Theory  
Credits 3. 3 Lecture Hours.  
Development of archaeology as a discipline; methods and theories used in archaeology for reconstructing cultural history and cultural process.

ANTH 603 Seafaring Life and Maritime Communities  
Credits 3. 3 Lecture Hours.  
Employs primary and scholarly sources to examine the social organization, work routines, living conditions, and material culture of mariners between 1450 and 1950; broader trends in maritime communities and global seafaring are also investigated.  
Prerequisite: Approval of instructor.

ANTH 604 Cultural Method and Theory  
Credits 3. 3 Lecture Hours.  
Survey of the theoretical concepts used in anthropology and how to construct models used in cultural and social anthropology.

ANTH 605 Conservation of Archaeological Resources I  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Fundamentals and applications of artifact conservation techniques in archaeology.  
Prerequisite: Knowledge of basic chemistry and physics recommended.

ANTH 606 Conservation of Archaeological Resources II  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Comprehensive study of techniques used in the identification and conservation of metal and wooden artifacts.  
Prerequisite: ANTH 605.

ANTH 607 Historical Archaeology  
Credits 3. 3 Lecture Hours.  
Past and present theoretical positions and research strategies in historical archaeology.  
Prerequisite: ANTH 313 recommended.

ANTH 608 Skills in Maritime Archaeology  
Credits 3. 3 Lecture Hours.  
Themes and tools of maritime archaeology; topics include remote sensing and mapping as well as interpreting, recording and storing data used in maritime archaeological surveys.  
Prerequisites: Graduate classification; approval of instructor.

ANTH 609 Culture and Evolution  
Credits 3. 3 Lecture Hours.  
This seminar will seek to integrate the study of culture with the natural sciences. The foundation of the course is the assumption that culture is a biological adaptation and that we can examine it scientifically.

ANTH 610 Outfitting and Sailing the Wooden Ship 1400-1900  
Credits 3. 3 Lecture Hours.  
Archaeological and historical sources to exam the outfitting and sailing of wooden ships between 1400 and 1900, a period popularly known as the "Age of Sail"; emphasis on two aspects that are of particular interest to the nautical archaeologist.  
Prerequisites: Approval of instructor; graduate classification.

ANTH 611 Nautical Archaeology  
Credits 3. 3 Lecture Hours.  
Introduction to the history and theoretical basis of nautical archeology as a discipline; fundamental concepts in nautical science relevant to the history of seafaring; key developments in the history of seafaring.  
Prerequisites: Approval of instructor and graduate classification.

ANTH 612 Preclassical Seafaring  
Credits 3. 3 Lecture Hours.  
Seafarers and watercraft of the ancient Near East and Mediterranean until ca. 700 B.C. Types of watercraft used, routes, cargoes, voyages of exploration and economics of maritime trade.

ANTH 613 Classical Seafaring  
Credits 3. 3 Lecture Hours.  
Culture history of Mediterranean seafarers between ca. 700 B.C. and end of Byzantine Empire; types of ships and boats, sea law, naval tactics, harbor-works, routes, cargoes and economics of trade.
ANTH 614 Books and Treatises on Shipbuilding
Credits 3. 3 Lecture Hours.
Examines a group of theoretical books of shipbuilding from the early 15th
to the early 19th century; an overview of the theory and conceptual models
with which ships were designed and built from the Renaissance to the 19th
century.
Prerequisite: ANTH 616.

ANTH 615 History of Shipbuilding Technology
Credits 3. 3 Lecture Hours.
Design and construction of preserved and excavated sailing ships, the
expertise of their builders and technology involved in ancient and early
shipbuilding.
Prerequisite: Approval of instructor.

ANTH 616 Research and Reconstruction of Ships
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Techniques of recording and interpreting excavated ships; preservation of
hulls; ship drafting, modeling, lofting, testing and other methods used in
the research and/or reconstruction of ships.
Prerequisite: Approval of instructor.

ANTH 617 Conservation III—Preservation of Organic Materials
Credits 3. 3 Lecture Hours.
Advanced and experimental methods of organic artifact conservation;
emphasis on composite artifacts, gamma radiation polymerization,
scanning electron microscope evaluation of artifacts and preservation of
traditionally difficult to conserve artifacts.
Prerequisite: ANTH 605.

ANTH 618 Medieval Seafaring in the Mediterranean
Credits 3. 3 Lecture Hours.
Cultural history of seafaring in the Mediterranean region during medieval
times; ship types and their uses, naval warfare, harbors, routes and cargoes, and maritime economic institutions and practices.
Prerequisite: Approval of instructor.

ANTH 619 Indians of Texas
Credits 3. 3 Lecture Hours.
Detailed study of diverse native/immigrant Texas Indian lifeways/cultures
from late pre-European to contemporary times; exploration of historical
underpinnings, traditional cultures, especially land-use patterns; detailed
assessment of tribal relationships with colonial powers, U.S., Texas
governments as evidenced in ethnographic, ethnohistoric, historical
materials; application to anthropological, archaeological, and human
ecology research.
Prerequisite(s): Graduate classification, ANTH 602, or ANTH 604, or 620,
or 650.

ANTH 620 Prehistory of Texas
Credits 3. 3 Lecture Hours.
Survey of Texas prehistory from initial migration of human population
11,500 years ago to extermination or removal of Native American cultures
by Europeans; processes of cultural adaptation and change to shifting
environments and subsistence material correlates of world views and
belief systems.

ANTH 622 Folklore Forms and Methods
Credits 3. 3 Lecture Hours.
Introduction to major genres of folklore, various theories and approaches
employed by researchers, and specialized resource materials in the
humanities and social sciences.
Prerequisites: Graduate classification in liberal arts and approval of
instructor.

ANTH 623 Folk Narrative
Credits 3. 3 Lecture Hours.
Theories and techniques used in the study of major folk narrative genres;
folktale and legend; brief survey of other narrative forms, including tall tale,
epic, myth, joke, personal and family narratives.
Prerequisites: Graduate classification in liberal arts and approval of
instructor.

ANTH 624/GEOG 687 Geoarchaeology
Credits 3. 3 Lecture Hours.
Application of geological concepts and methods to archaeological
research; history of geoarchaeology; site formation processes;
modification of archaeological sites and sediments; landscape
reconstruction and change and their effects on human behavior.
Prerequisite: ANTH 602 or equivalent.
Cross Listing: GEOG 687/ANTH 624.

ANTH 625 Zooarchaeology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Analysis of animal bones from archaeological sites; inference of how
prehistoric peoples hunted, domesticated and used animals.
Prerequisite: Basic knowledge of zoology and archaeology.

ANTH 626 Human Paleopathology
Credits 3. 3 Lecture Hours.
Pathological lesions exhibited in prehistoric or early historic human
remains; problems in diagnosing lesions in fossil skeletal remains, and
evaluating the occurrence of these lesions in past populations.
Prerequisite: ANTH 425.

ANTH 627 Human Paleonutrition
Credits 3. 3 Lecture Hours.
Pathological lesions exhibited in prehistoric or early historic human
remains; problems in diagnosing lesions in fossil skeletal remains, and
evaluating the occurrence of these lesions in past populations.
Prerequisite: ANTH 425.

ANTH 628 New World Seafaring
Credits 3. 3 Lecture Hours.
Cultural history of seafaring in the Western Hemisphere from the fifteenth
century to the present; ship types and their uses; harbors, commerce,
naval warfare, sailing routes, maritime practices.
Prerequisites: ANTH 615 and ANTH 616 or approval of instructor.

ANTH 629 Post-Medieval Seafaring
Credits 3. 3 Lecture Hours.
Cultural history of European seafaring from the fifteenth century to the
early twentieth century; ship types and their uses, shipping routes and
cargoes, maritime technology and economic institutions, seafaring
practices, and naval warfare.
Prerequisites: ANTH 615 and ANTH 616 or approval of instructor.

ANTH 630 Human Evolutionary Ecology
Credits 3. 3 Lecture Hours.
Evolutionary ecology of human behavior and culture, including habitat
choice and use of space, time allocation, resource acquisition and
allocation, sex and reproduction, altruism and cooperation and the
coevolution of genes and culture.
Prerequisite: Graduate classification.
ANTH 631 Primate Behavioral Ecology  
Credits 3. 3 Lecture Hours.  
Survey the behavioral ecology of the nonhuman primates exploring topics such as their hunting behavior; sexual coercion; language capabilities; culture; tool use; homosexuality; dominance; parental care, ethics of field study and their conservation.  
Prerequisite: Graduate classification.  

ANTH 632 Archaeology of Death  
Credits 3. 3 Lecture Hours.  
Ethnographic and archaeological literature regarding human funerary behavior; emphasis on theoretical developments in the interpretation of burials for reconstructing social organization and social change; examine how mortuary practices and archaeological excavation define the burial assemblages studied by bioarchaeologists.  
Prerequisite: Graduate classification.  

ANTH 633 Deep Submergence Archaeology  
Credits 3. 3 Lecture Hours.  
Addresses issues in the new field of deep submergence archaeology by examining the discipline's history, technologies, specific case studies of ship wrecks in deep water and related topics. Students will interact with leaders in the field via video conferencing and visiting lecturers.  
Prerequisite: Approval of instructor.  

ANTH 634 Palynology  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Principles and techniques used in palynology, pollen morphology, ontogeny, biochemistry, dispersion and preservation; role of palynology as a research tool in plant taxonomy agriculture, medicine, paleobotany and anthropology.  

ANTH 635 Violence and Warfare  
Credits 3. 3 Lecture Hours.  
The anthropological study of violence and warfare and the place of these phenomena in cultural evolution, religion, economics, politics and social structure; particular attention paid to the rise of industrialized warfare and its impact on the pre-industrial world.  
Prerequisite: Graduate classification.  

ANTH 636 Computer Graphics in Archaeology  
Credits 3. 3 Lecture Hours.  
Focuses on the acquisition, manipulation, and presentation of archaeological data and images; a variety of state-of-the-art technologies will be employed to develop professional desktop publications, slide and digital presentations, electronic publications and images.  
Prerequisite: Graduate classification.  

ANTH 637 Paleoethnobotany  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Interrelationship between plants and humans from prehistoric times to present, theoretical and methodological use of botany as a research tool for the understanding of cultural systems.  

ANTH 638 Proposal Writing in Anthropology  
Credits 3. 3 Lecture Hours.  
Workshop class designed to assist advanced doctoral students in writing research grant proposals to fund their dissertation projects. Students will craft their own NSF-style Dissertation Improvement proposals, should be prepared to accept constructive criticism of their work, and to offer it on the work of their classmates.  
Prerequisites: GB standing and approval of instructor.  

ANTH 639/WGST 639 Gender, Ethnicity, and Class in Archaeological Research  
Credits 3. 3 Lecture Hours.  
Explores theoretical and methodological issues in engendering archaeology; ideological biases in the interpretation of roles attributed to women, men and underrepresented groups in the past; the impact of cultural transformations on underrepresented groups and gender relations; and how to formulate research questions concerning these issues.  
Prerequisite: Graduate classification.  
Cross Listing: WGST 639/ANTH 639.  

ANTH 640 Anthropological Ethics and Professionalism  
Credits 3. 3 Lecture Hours.  
Codes of professional ethics applicable to excavation and preservation of archaeological sites; ethnographic fieldwork and professional relationships with colleagues and informants; professional protocols for publication and presentation of research results.  
Prerequisites: Graduate classification in anthropology and approval of instructor.  

ANTH 641 Applied Anthropology  
Credits 3. 3 Lecture Hours.  
Theory, ethics and practical applications of anthropological methods and concepts as they relate to planned programs of socio-cultural change.  

ANTH 642 Research Design in Anthropology  
Credits 3. 3 Lecture Hours.  
Research design used by anthropologists to develop sampling strategies, test hypotheses and compile quantitative data.  
Prerequisite: ANTH 602.  

ANTH 643 Australopithecine Paleoecology  
Credits 3. 3 Lecture Hours.  
Principles and techniques used in the reconstruction of paleoecology and paleoenvironments associated with the African australopithecines; including taphonomy, faunal evolution, climate forcing analysis, habitat preference and land-use patterns; detailed overview of the australopithecine fossil record from the Miocene to the Pleistocene.  
Prerequisite: Graduate classification.  

ANTH 644 Classical Archaeology  
Credits 3. 3 Lecture Hours.  
History of the discipline through the individuals, organizations, excavations, theoretical models and ethical issues that have shaped it.  
Prerequisite: Graduate classification.  

ANTH 645 Cultural Resources Management  
Credits 3. 3 Lecture Hours.  
History of cultural resources management (CRM): current federal and state laws and regulations; methods of determining site significance; the stages of CRM investigations; and the preparation of research designs and proposals; ethical issues such as curation and the treatment of human remains discussed.  
Prerequisite: Graduate classification.  

ANTH 646 Ceramic Artifact Analysis  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
The introduction of the basic concepts, methods, and approaches used in the analysis of archaeological pottery with a focus on the techniques and theories used to bridge the gap between the recovery of ceramic artifacts and their interpretation within various anthropological contexts.  
Prerequisite: Graduate classification.
ANTH 647 Lithic Artifact Analysis
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Laboratory-based course reviewing methods archaeologists use to analyze stone tools and debitage, including identification of tool-stone sources, reconstruction of technology, explanation of assemblage variability, and microscopic use-wear analysis.
Prerequisite: Graduate classification and approval of instructor.

ANTH 648 Issues in Human Evolutionary Theory
Credits 3. 3 Lecture Hours.
Examination of core concepts and theories in evolutionary biology and paleoanthropology, including human evolution, the species concept, and the role of the human fossil record.
Prerequisite: Graduate classification.

ANTH 649 Origin and Evolution of the Genus Homo
Credits 3. 3 Lecture Hours.
Survey of the human fossil record with a focus on Plio-Pleistocene specimens assigned to our own genus, Homo; provides an overarching picture of the evolutionary history of humans after the Australopithecines and reviews theoretical issues that have influenced our understanding of the evolution of Homo sapiens.
Prerequisite: Graduate classification or approval of instructor.

ANTH 650 Ethnographic Field Methods
Credits 3. 3 Lecture Hours.
Methods common to anthropology for the field collection of data on cultural behavior.
Prerequisites: Graduate classification and approval of instructor.

ANTH 651 Pleistocene Prehistory of Northeast Asia and Alaska
Credits 3. 3 Lecture Hours.
Survey of the Ice-Age paleoenvironments, prehistory and paleoanthropology of Siberia, China, Japan, and Bering Land Bridge area, especially in the context of human colonization of the region and origins of the first Americans.
Prerequisite: Graduate classification.

ANTH 652 First American Archaeology
Credits 3. 3 Lecture Hours.
Survey of past frontiers in First American studies important to the peopling of the Americas: review of the archaeology, geology, and dating of early sites in North, Middle, and South America; human migration hypotheses; biological evidence; and late Quaternary environmental factors.
Prerequisite: Approval of instructor.

ANTH 653 Hunter-Gatherer Archaeology
Credits 3. 3 Lecture Hours.
Overview of development of hunter-gatherer archaeology; current methodological and theoretical issues, especially use of ethnographic and environmental data; ecologically oriented case studies of late Pleistocene and Holocene hunter-gatherers; emphasis on land-use, site-structure, and site formation analyses, especially in North America.
Prerequisites: ANTH 602 or ANTH 604 or approval of instructor.

ANTH 654 Archaeological Photography
Credits 3. 3 Lecture Hours.
Instruction on how to better use cameras in the process of reporting archaeological sites and material culture by exploring old and new photographic technologies.
Prerequisite: Graduate classification.

ANTH 655 Empires and World-System
Credits 3. 3 Lecture Hours.
Application of the anthropological perspective to the problem of the rise of empires and the modern world-system over the last 600 years of world history; topics include ecocide, ethnocide, ethnogenesis and warfare.

ANTH 656 Ancient Foodways and Cooking Technology
Credits 3. 3 Lecture Hours.
Study of ancient foodways and cooking technologies, particularly fire-based methods, especially in the context of human evolution, subsistence and settlement behavior, social organization, theoretical underpinnings, and archaeological manifestations thereof, with the focus on ancient hunter-gatherer populations, wild plants, terrestrial animals, and aquatic resources.
Prerequisite: ANTH 602 or ANTH 604 or approval of Instructor.

ANTH 657 Topics in Technological Organization
Credits 3. 3 Lecture Hours.
Review of current problems in the study of artifact assemblages; focus on theory explaining variability in artifact forms and technologies, especially in the contexts of subsistence and settlement behavior as well as exchange and social organization; alternating sections focus on lithic or ceramic technologies. May be taken two times for credit.
Prerequisite: Graduate classification or approval of instructor.

ANTH 658 The Paleolithic World
Credits 3. 3 Lecture Hours.
(3-0). Survey of the Paleolithic archaeological record, beginning with the Oldowan and ending with the Upper Paleolithic and dispersal of modern humans to Australia and the Americas; review of major changes in technology, subsistence and land-use strategies that shaped the Paleolithic World.
Prerequisite: Graduate classification or approval of instructor.

ANTH 660 Field Archaeology
Credits 1 to 12. 1 to 12 Other Hours.
Field instruction in the methods of archaeological excavations; recovery and cataloging of cultural, floral and faunal remains; and interpretation of these data. Locations of the field course will vary according to site. Field trips required. May be taken more than once but not to exceed 8 hours of credit toward an MA degree and not to exceed 12 hours of credit toward a PhD degree.
Prerequisite: ANTH 602 or equivalent.

ANTH 661 Environmental Archaeology
Credits 3. 3 Lecture Hours.
Examination of the paleoenvironmental context in which past humans interacted with the natural environment; review of advanced principles, method and theory, and practical applications used in paleoenvironmental reconstruction.
Prerequisite: Graduate classification or approval of instructor.

ANTH 662 Method and Theory in the Peopling of the Americas
Credits 3. 3 Lecture Hours.
Interdisciplinary review of current evidence from the fields of archaeology, genetics, biological anthropology and paleoecology for the dispersal of modern humans to the New World during the Pleistocene; understanding theory and method used to explain prehistoric human migration and colonization of empty lands.
Prerequisite: Graduate classification or approval of instructor.
Prerequisite: Graduate classification or approval of instructor.

ANTH 684 Anthropology Internship
Credits 3 to 9. 3 to 9 Other Hours.
Opportunity to put anthropology learned in the classroom into practice; may be used to gain practical experience in a variety of settings including: local, state or federal agencies; museums; non-profit organizations; non-governmental organizations; and private firms.
Prerequisites: ANTH 601, ANTH 602, ANTH 604 or ANTH 602, ANTH 615, ANTH 616; approval of committee chair.

ANTH 685 Directed Studies
Credits 1 to 12. 1 to 12 Other Hours.
Directed individual study of selected problems in anthropology.
Prerequisite: Approval of instructor.

ANTH 689 Special Topics in...
Credits 1 to 12. 1 to 12 Lecture Hours.
Selected topics in an identified area of anthropology. May be repeated for credit.
Prerequisite: Approval of instructor.

ANTH 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research for thesis.
Prerequisite: Approval of graduate advisor.

ARAB - Arabic

Courses

ARAB 101 Beginning Arabic I
Credits 4. 4 Lecture Hours.
(ARAB 1411, 1511) Beginning Arabic I. Introduction to Modern Standard Arabic in its written and spoken forms; emphasis on conversation, rudimentary vocabulary, simple grammar, and reading.

ARAB 102 Beginning Arabic II
Credits 4. 4 Lecture Hours.
(ARAB 1412, 1512) Beginning Arabic II. Introduction of more complex grammatical constructions; vocabulary building; emphasis on putting acquired vocabulary and grammar to conversational use.
Prerequisite: ARAB 101 or equivalent.

ARAB 201 Intermediate Arabic I
Credits 3. 3 Lecture Hours.
(ARAB 2311) Intermediate Arabic I. Practice of listening, speaking, and writing skills; vocabulary building; discussion of topics related to daily life and general aspects of Arab culture.
Prerequisite: ARAB 102 or equivalent.

ARAB 202 Intermediate Arabic II
Credits 3. 3 Lecture Hours.
(ARAB 2312) Intermediate Arabic II. Emphasis on comprehending printed material, perfecting pronunciation, and attending to more complex grammar; discussion of topics holding general and professional interest; knowledge of Arab culture and history.
Prerequisite: ARAB 201 or equivalent.

ARAB 211 Introduction to Arabic Language and Society
Credits 3. 3 Lecture Hours.
Examination of critical linguistic issues in the Arab world from a sociolinguistic perspective, including language and religion; language and power; language and nationalism; and language and education.
Prerequisite: Approval of instructor.

ARAB 221 Field Studies I: Language, Culture, and Society
Credits 3. 3 Lecture Hours.
Arabic language and culture taught in an Arabic-speaking country; living with a host family; supervised travel of cultural interest; participation in activities of host institution.
Prerequisite: ARAB 102 or equivalent.

ARAB 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Individual supervision of readings or assigned projects in an Asian Language, selected for each student individually; written or oral reports.
Prerequisite: Approval of Arabic and Asian Language Office Director.

ARAB 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of Arabic studies. May be repeated for credit.
Prerequisite: Approval of instructor.

ARAB 301 Reading and Composition
Credits 3. 3 Lecture Hours.
Advanced Arabic grammar and readings of average difficulty and of different genres, including literary and journalistic texts and other culturally-enriched materials in order to develop awareness of cultural products, perspectives, and practices found in the Arab world.
Prerequisites: ARAB 202; junior or senior classification or approval of instructor.

ARAB 302 Reading and Composition II
Credits 3. 3 Lecture Hours.
Readings of average difficulty and of different genres, including literary and journalistic texts and other culturally-enriched materials; development of writing skills with emphasis on grammatical constructions; expansion of vocabulary and oral expression.
Prerequisites: ARAB 301; junior or senior classification or approval of instructor.

ARAB 321 Business Arabic
Credits 3. 3 Lecture Hours.
Business and financial terminologies useful in the Arab World; cultural etiquette for effective communication in Arabic business settings; oral and written business reports from a variety of authentic sources; language skills and communication strategies for traveling, shopping and conducting financial transactions in the Arab World.
Prerequisite: ARAB 202 or equivalent.
ARAB 322 Field Studies II: Language, Culture, and Society
Credits 3. 3 Lecture Hours.
Arabic language and culture taught in an Arabic-speaking country; living with a host family; supervised travel of cultural interest; participation in activities of host institution.
Prerequisite: ARAB 202 or equivalent.

ARAB 323 Media Arabic
Credits 3. 3 Lecture Hours.
Analysis of current events in the Arab World; use of print and electronic materials in Arabic from variety of media sources; discussion of different points of view in media representation/coverage; issues pertaining to business, politics, culture and entertainment in the Arab World.
Prerequisite: ARAB 202 or equivalent.

ARAB 475/COMM 475 Media and the Middle East
Credits 3. 3 Lecture Hours.
Examination of how media (e.g., literature, news, film, television) contribute to our understanding of historical events in the Middle East; analysis of cultural, social, political and historical circumstances of media representation of events; exploration of various media genres' techniques and narrative structure. May be taken two times for credit with a focus on different medium.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: COMM 475/ARAB 475.

ARAB 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Individual supervision of readings or assigned projects selected for each student individually; written or oral reports.
Prerequisite: Approval of instructor and Director of AALO.

ARAB 489 Special Topics in...
Credits 1 to 4. 1 to 4 Other Hours.
Selected topics in an identified area of Arabic studies. May be repeated for credit.
Prerequisite: Approval of instructor.

ARAB 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research in Arabic studies conducted under the direction of faculty member approved by the Director of AALO. May be taken 2 times for credit.
Prerequisites: Junior or senior classification and approval of instructor.

ARCH - Architecture

Courses

ARCH 205 Architecture Design I
Credits 4. 1 Lecture Hour. 9 Lab Hours.
Issues and methods in designing environments for human habitation and well-being; projects addressing site, functional planning, spatial ordering, form generation through a recognition of the synthesis of space, structure, use and context; reinforcement of appropriate graphic and model building techniques.
Prerequisites: ENDS 105, ENDS 106, ENDS 115, ENDS 116.*

ARCH 206 Architecture Design II
Credits 5. 2 Lecture Hours. 9 Lab Hours.
Fundamental issues of innovative design processes and creation explored through the creative use of past, present and future materials, tools, and technologies; with an emphasis upon the research of materials, methods, scale, craft and technique as instruments of design, fabrication, and production.
Prerequisites: ARCH 205; ENDS 105, ENDS 106, ENDS 115, ENDS 116.*

ARCH 207 Architecture Design II
Credits 5. 2 Lecture Hours. 9 Lab Hours.
Technology as medium for design planning and communication; impact and influence of technology on architectural design process; investigation of computing theories, systems, methods and current and future trends through creative thinking and innovation design, problem solving and creation with the use of digital media.
Prerequisites: ARCH 205 and ENDS 105, ENDS 106, ENDS 115, ENDS 116.*

ARCH 212 Social and Behavioral Factors in Design
Credits 3. 3 Lecture Hours.
Social and behavioral factors in the built and natural environment; environmental perception and spatial cognition; social-environmental processes such as privacy and crowding; setting-oriented discussion on residences, education, and the workplace; the psychology of nature and natural resource management; social design and social science contribution to architectural design.

ARCH 213 Sustainable Architecture
Credits 3. 3 Lecture Hours.
A comprehensive introduction to sustainability concepts, techniques and applications at all levels of the built environment, history of contemporary development of sustainable architecture from 1960 to the present; design strategies, environmental technologies and social factors for reducing building energy needs and carbon foot prints; global applications of sustainable approaches.
Prerequisite: Sophomore classification or approval of instructor.

ARCH 216 Computational Methods in Architecture
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Software and processes for computation design in architecture; image editing and creation, vector drawing, 3D modeling, parametric modeling, rendering techniques and simulation.
Prerequisite: ENDS 116 or approval of instructor.

ARCH 249 Survey of World Architecture History I
Credits 3. 3 Lecture Hours.

ARCH 250 Survey of World Architecture History II
Credits 3. 3 Lecture Hours.
(ARCH 1302) Survey of World Architecture History II. A survey of world architecture and the human-designed and built environment from the 13th to the 19th century.

ARCH 260 Comparative Theory in the Built and Virtual Environments
Credits 3. 3 Lecture Hours.
Introduction of cultural theory and the environment; theories, special concepts and ideas relevant to the built and virtual environments with primary focus on the last fifty years; theory, theory building, and application to buildings and urban design; formation of ideas and critical ways of assessing the environment.
ARCH 291 Research in Architecture Innovation
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in the College of Architecture. May be repeated 2 times for credit.
Prerequisite: Approval of instructor and department head.

ARCH 305 Architectural Design III
Credits 5. 2 Lecture Hours. 9 Lab Hours.
Integration of architectural theories and philosophy with environmental design systems; study of theoretical approaches to graphic and analytical thinking, problem identification and design dissemination through various media, case studies and problem resolution; conditions and forces associated with a variety of building types and the generation design solutions.
Prerequisites: Admission to upper level in environmental design; ARCH 249 and ARCH 250.*

ARCH 317 Digital Fabrication for Architecture
Credits 3. 1 Lecture Hour. 4 Lab Hours.
Digital fabrication for architecture including software, numerically controlled tools, translation applications and management strategies for digital fabrication workflows; production of building components from three dimensional datasets of virtual architecture proposals.
Prerequisites: Junior or senior classification, or approval of instructor; ENDS 106.

ARCH 327 Conceptual Structural Analysis
Credits 3. 1 Lecture Hour. 4 Lab Hours.
A non-mathematical investigation of structural systems and components with respect to behavior; selection of the most appropriate structural system for various building typologies.
Prerequisite: Junior or senior classification or approval of instructor.

ARCH 328 Architectural Envelopes
Credits 3. 3 Lecture Hours.
Study of roof, wall, glazing and screen systems of significant works in contemporary architecture and the strategies behind their making; focus on innovative materials, surface effects, and performance aspects.
Prerequisite: Junior or senior classification in environmental design.

ARCH 330 The Making of Architecture
Credits 3. 3 Lecture Hours.
Study of significant works of contemporary architecture and materials and strategies used in their making; focus on innovative materials, systems, and partnerships necessary to realize the design.
Prerequisites: Junior or senior classification in environmental design or approval of instructor or ARCH classification.

ARCH 331 Architectural Structures
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Physical principles that govern statics and strength of materials through the design of architectural structures from a holistic view, in the context of architectural ideas and examples; introduction to construction, behavior of materials, and design considerations for simple and complex structural assemblies; computer applications.
Prerequisites: Junior or senior classification in environmental design; MATH 142 or equivalent; PHYS 201.

ARCH 335 Architectural Systems
Credits 3. 3 Lecture Hours.
Theory and applications of building energy use, envelope design, shading analysis, heating and cooling systems, lighting design; building water supply, plumbing and drainage systems; electrical, acoustical, fire and lightning protection; life safety; transportation systems and construction materials; calculations, equipment selection, and component sizing as they relate to building design.
Prerequisites: Junior or senior classification in environmental design; PHYS 201.

ARCH 345 History of Building Technology
Credits 3. 3 Lecture Hours.
Chronological development of civilization and building technology from prehistoric cultures to present; classic and modern materials, structural devices past and present, machine-produced products, prefabrication, construction methodology and servicing.

ARCH 350 History and Theory of Modern and Contemporary Architecture
Credits 3. 3 Lecture Hours.
Development of modern and contemporary architecture in the 20th and 21st centuries; materials, structure, social and economic changes as well as architectural theory.
Prerequisites: Junior or senior classification.

ARCH 405 Architectural Design IV
Credits 5. 2 Lecture Hours. 9 Lab Hours.
A comprehensive design studio focused on the integration of design theory with functionally sustainable environmental and structural systems; consideration of a project from site analysis and programming through design detailing.
Prerequisites: Admission to upper level in environmental design; ARCH 305, ARCH 331, ARCH 335; CARC 301 or ARCH 494; concurrent enrollment in ARCH 431 and ARCH 435.*

ARCH 406 Architecture Design V
Credits 5. 2 Lecture Hours. 9 Lab Hours.
Topical approaches to design, emphasizing theory and practice of architecture or related disciplines, such as urban design, interior design, health care design, etc.
Prerequisites: Junior or senior classification; admission to upper level in environmental design; ARCH 305, ARCH 331 and ARCH 335; CARC 301 or ARCH 494; students may with approval of the department enroll in the course during the summer term prior to taking ARCH 405, ARCH 431 and ARCH 435 if they are within 20 credit hours of graduation prior to the beginning of the following fall semester.*

ARCH 421 Energy and Sustainable Architecture
Credits 3. 3 Lecture Hours.
Understanding the various design decisions impacting sustainability and energy efficiency; includes participation in an “academic” LEED-NC rating project; interdisciplinary team approach with a design studio architect to perform the LEED-NC rating on the architect’s building; application of reference material, standards, and USGBC material.
Prerequisite: Junior and senior classification or approval of instructor.

ARCH 430 History of Ancient Architecture
Credits 3. 3 Lecture Hours.
Architecture of antiquity, examining stylistic, structural and theoretical advancements in building, beginning with Mesopotamian and continuing with Egyptian, Greek and Roman civilizations.
Prerequisite: ARCH 249 or ARTS 148; junior or senior classification or approval of degree coordinator or instructor.
ARCH 431 Integrated Structures
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Selection and economics of structural systems in the context of integrating structural systems into a building through good design; analysis and design of wood, steel, concrete, and composite systems and members in relation to building design.
Prerequisites: Admission to upper level in environmental design; ARCH 305, ARCH 331, ARCH 335; concurrent enrollment in ARCH 405 and ARCH 435.

ARCH 433 Architectural Lighting
Credits 3. 3 Lecture Hours.
Theory and practice of lighting design as an art and science; aperture design for sunlight control; selecting and locating luminaries to enhance interior and exterior surfaces and spaces.
Prerequisite: Junior or senior classification.

ARCH 434 The Role of Sculpture and Painting in Ancient Architecture
Credits 3. 3 Lecture Hours.
Interrelationships of architecture, painting and sculpture in the ancient world including Egypt, Mesopotamia, Crete, Greece and Rome.
Prerequisite: ARCH 249 or ARTS 149; junior or senior classification or approval of degree coordinator or instructor.

ARCH 435 Integrated Systems
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Understanding how to integrate sustainable environmental systems into a building through good design; lectures support studio; systems faculty participate in studio critiques throughout the project.
Prerequisites: Admission to upper level in environmental design; ARCH 305, ARCH 331, ARCH 335; concurrent enrollment in ARCH 405 and ARCH 431.

ARCH 437 Great Medieval Cathedrals
Credits 3. 3 Lecture Hours.
Interrelationships of architecture, sculpture and stained glass, technology and construction, function and form, society and patronage in the great period of medieval building.
Prerequisite: ARCH 250 or ARTS 150; junior or senior classification or approval of degree coordinator or instructor.

ARCH 438 History and Design of Sacred Architecture
Credits 3. 3 Lecture Hours.
Exploration of history and design of sacred architecture; review of historic and contemporary houses of worship; global historic trends in sacred architecture in light of the current development in liturgy and design; significance of sacred places to society and culture.
Prerequisite: Junior or senior classification or approval of instructor.

ARCH 439 Architectural History of Mexico
Credits 3. 3 Lecture Hours.
History of architecture and urban design of Mexico and the southwestern United States from pre-Hispanic to contemporary eras.
Prerequisites: ARCH 249 or ARCH 250; junior or senior classification or approval of degree coordinator or instructor.

ARCH 441 Baroque and Rococo Architecture
Credits 3. 3 Lecture Hours.
The investigation of the history of architecture, the arts and society, and major creative individuals from the late sixteenth to the early eighteenth centuries.
Prerequisite: ARCH 250 or ARTS 150; junior or senior classification or approval of degree coordinator or instructor.

ARCH 443 Aegean Art and Architecture
Credits 3. 3 Lecture Hours.
Art and architecture of the prehistoric Aegean, ca. 6000-1100-B.C.E.; focus on the built environment, material culture and visual arts of early civilization in the Aegean basin; evidence for regional and vernacular architectural traditions; expressions of power, ideology and social identity through monumental architectural and elite arts of Minoan Crete and Mycenaean Greece.
Prerequisites: Junior or senior classification; approval of instructor or degree coordinator.

ARCH 446 Foundations of Historic Preservation
Credits 3. 3 Lecture Hours.
Exploration and evaluation of the cross-disciplinary work of historic preservation; emphasis on the significance of historic places to societal well-being and conservation alternatives for historic and cultural environments; review of preservation projects and treatments; guest presentations and case studies from practicing professionals and researchers in a variety of fields.
Prerequisite: Junior or senior classification or approval of instructor.

ARCH 451 Strategies in Architectural Management
Credits 3. 3 Lecture Hours.
Emerging strategies in the architecture and construction industry, with an emphasis on understanding the changing structure of the industry and the management of both firms and projects.
Prerequisite: Senior classification or approval of degree coordinator.

ARCH 452 Careers in Architecture
Credits 3. 3 Lecture Hours.
Career opportunities in the profession of architecture; investigations into the composition of architectural practice today and the wide range of specialties represented in architectural firms; interviews with select representative individuals.
Prerequisite: Admission to upper level in environmental design, construction science or landscape architecture.

ARCH 457 Ethics and Professional Practice
Credits 3. 3 Lecture Hours.
Issues and relationships within the business, legal and political environment; introduction to the concepts of architectural specifications and the AIA standard conditions of the construction contract; forms of construction, bidding and contract documents. For undergraduate students pursuing a professional degree and a career in architecture.
Prerequisite: Senior classification in environmental design.

ARCH 458 Cultural and Ethical Considerations for Global Practice
Credits 3. 3 Lecture Hours.
Issues and relationships within the cultural, business, legal and political environments of global practice; differences in the construction contract, bidding and various forms of construction.
Prerequisite: Junior or senior classification.

ARCH 463 Elements of Interior Architecture
Credits 3. 3 Lecture Hours.
Analysis and design of architectural interiors; historical and professional perspectives incorporating programming, space planning and organization; specification and selection of furnishings and materials to satisfy user needs in residential, commercial and institutional settings.
Prerequisites: Admission to upper level in environmental design; concurrent enrollment in ARCH 405, ARCH 431 and ARCH 435 not allowed.
ARCH 481 Seminar
Credit 1. 1 Lecture Hour.
Presentations by and discussions with professionals representing specialty areas related to environmental design; career and academic objectives. May be repeated for up to 4 credit hours. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisite: Junior or senior classification or approval of instructor.
ARCH 484 Summer Internship
Credits 6. 12 Other Hours.
Practical experience in an office of design allied professionals; 10-week internship with a minimum of 600 hours continuous employment; departmental pre-approval through the departmental internship coordinator required; post evaluation conducted following the internship. May not be repeated for credit.
Prerequisites: Junior or senior classification or approval of instructor; approval of the environmental design internship coordinator.
ARCH 485 Directed Studies
Credits 1 to 5. 1 to 5 Other Hours.
Special projects in architecture. May be repeated for credit.
Prerequisites: Admission to upper level in environmental design; approval of instructor and degree coordinator.
ARCH 488 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Special topics in an identified area of architecture. May be repeated for credit.
Prerequisite: Junior or senior classification; approval of instructor and degree coordinator.
ARCH 491 Advanced Architecture Innovation Research
Credits 1 to 6. 1 to 6 Other Hours.
Research conducted under the direction of faculty member in the College of Architecture. May be repeated 2 times for credit.
Prerequisite: Admission to upper level in environmental design; approval of instructor and department head.
ARCH 494 Internship
Credits 9. 18 Other Hours.
Practical experience in an office of design allied professionals; fifteen week internship with a minimum of 600 hours of continuous employment; departmental pre-approval through the departmental internship coordinator required; post evaluation conducted following the internship. To be taken only as a requirement for the study away semester. May not be repeated for credit.
Prerequisites: Junior or senior classification; admission to upper level in environmental design; CARC 481; approval of the environmental design internship coordinator.
ARCH 600 Introduction to Architecture and Urban Design
Credits 2. 1 Lecture Hour. 1 Lab Hour.
Introductory seminar and studio on architecture and urban design; focus on topical readings, in-class discussions and short writing exercises; provides opportunity to learn or refine hand drawing, rendering, and model building, and to learn to be productive and creative within the studio context.
Prerequisite: Graduate classification in architecture or approval of instructor.
ARCH 601 Design Fundamentals I
Credits 6. 3 Lecture Hours. 9 Lab Hours.
Introduction to the development of verbal (design vocabulary), graphic, research and critical thinking skills through the design of small-scale projects, and investigation of typologies and precedents as the basis for architectural design.
Prerequisites: Graduate classification in architecture or approval of instructor; career change program, ARCH 600 and concurrent enrollment in ARCH 610.
ARCH 602 Design Fundamentals II
Credits 6. 3 Lecture Hours. 9 Lab Hours.
Further development of verbal, graphic, research and critical thinking skills through architectural design projects, with emphasis on basic understanding of major philosophical doctrines and their influence on architectural theory; studies of place-making, space, form and order; knowledge of world views, formal spatial manipulations and design vocabulary.
Prerequisites: ARCH 601, ARCH 610, ARCH 612 or approval of instructor.
ARCH 603 Design Fundamentals III
Credits 6. 3 Lecture Hours. 9 Lab Hours.
Theory and practice of architecture; methods and techniques used in the analysis and synthesis of concepts unique to spatial enclosure; developing responses to building systems; objects in a current cultural, physical or social context; complex building programs, site development and design solutions integrating formally expressive visual ideas and functional planning.
Prerequisite: ARCH 602.
ARCH 605 Architectural Design I
Credits 6. 2 Lecture Hours. 12 Lab Hours.
Application of verbal, graphic, research, critical thinking and fundamental design skills to architectural projects that emphasize design theory, systems of ordering in architecture and urban design, use of precedents, site and contextual issues; includes program development and concerns for public health, safety and welfare. Core design studio for professional degree candidates.
Prerequisite: Graduate classification in architecture or approval of instructor.*
ARCH 606 Architectural Design II
Credits 6. 2 Lecture Hours. 12 Lab Hours.
Application of verbal, graphic, research, critical thinking and fundamental design skills to architectural projects that emphasize the integration of structural, environmental, life safety, building envelope systems, and building service systems; includes code compliance, resource conservation, cost control and economic analysis. Core design studio for professional degree candidates.
Prerequisite: ARCH 605.*
ARCH 607 Architectural Design III
Credits 6. 2 Lecture Hours. 12 Lab Hours.
Application of verbal, graphic, research, critical thinking and comprehensive design skills to advanced architectural projects or design competitions that address cultural traditions, human behavior and diversity, the context of architecture, collaborative skills, ethics and professional judgement. Core design studio.
Prerequisite: ARCH 606.*
ARCH 610 Visual Communications
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Investigation and practice of various communication techniques used to explore, verify and present design decisions in architecture; freehand drawing principles; graphic theory and mechanical drawing techniques; architectural presentation and rendering methods in different media and their application.
Prerequisite: Graduate classification or approval of instructor; concurrent enrollment in ARCH 601.

ARCH 612 Structural and Environmental Technology Concepts
Credits 3. 3 Lecture Hours.
An introductory course which is intended to quickly and broadly develop the vocabulary base, visual understanding and familiarity with technological systems that architects deal with throughout their practice.
Prerequisites: Graduate classification or approval of instructor; MATH 142 and PHYS 201 or equivalents.

ARCH 614 Elements of Architectural Structures
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Investigation of the structural factors that influence the development of architectural space and form; introduction of the physical principles that govern statics and strength of materials through design of timber and steel components of architectural structures.
Prerequisite: ARCH 612 or approval of instructor.

ARCH 615 Elements of Environmental Control Systems
Credits 3. 3 Lecture Hours.
Theory and applications of building energy use, envelope design, shading analysis, heating and cooling systems, lighting design, building water supply plumbing and drainage systems, electrical, acoustical, fire and lightning protection, transportation systems and construction materials; design opportunities, calculations, equipment selection, and component sizing as they relate to design.
Prerequisite: ARCH 612 or approval of instructor.

ARCH 619 Applied Solar Energy
Credits 3. 3 Lecture Hours.
Technology behind applied solar energy design, including: calculating solar radiation, heat transfer related to solar design; active systems; FCHART and economics.
Prerequisites: Graduate classification or approval of instructor; ARCH 335 or ARCH 615 or equivalents.

ARCH 621 Energy Optimization in Building Design
Credits 3. 3 Lecture Hours.
Optimum energy use strategies for commercial buildings, hourly energy simulation methods, building envelope and HVAC system energy optimization by computer simulation techniques; life-cycle cost analysis of building energy systems; case studies in commercial building applications.
Prerequisites: Graduate classification or approval of instructor; ARCH 633 or ARCH 615 or equivalents.*

ARCH 622 Sustainable Building Design Technology
Credits 3. 3 Lecture Hours.
Fundamentals of sustainability in building, including social, political and economic issues—focusing particularly on conservation of natural resources; design and construction of earth integrated solar buildings, including cooling, heating, lighting and habitability assessments.
Prerequisite: Graduate classification or approval of instructor.

ARCH 623 Design Methods I
Credits 3. 3 Lecture Hours.
Importance of intuitive methods in design; meaning, symbolism and creativity in art and architecture; techniques to develop creative approaches to problem-solving.
Prerequisite: Graduate classification or approval of instructor.

ARCH 624 Theory of Placemaking
Credits 3. 3 Lecture Hours.
An introduction to and an exploration of the sources, principles, theories, and physical expressions of the phenomenon of place creation and its relationship to sustainable urbanism; investigates the origin of place theory and its meaning as expressed in the various forms, functions and scales of places applicable to architecture and planning.
Prerequisite: Graduate classification or approval of instructor.

ARCH 628 Tools for Green Building Design
Credits 3. 3 Lecture Hours.
Modeling tools and techniques to explore and support sustainable design; develop a deeper understanding of the relationship between architectural design and the environmental forces of sun, wind, and light; design-centered course; helps test the students architectural designs through the use of available modeling tools.
Prerequisite: Graduate classification or approval of instructor.

ARCH 631 Applied Architectural Structures
Credits 3. 3 Lecture Hours.
Structural analysis of building structural systems: components, frames, shapes; selection and economics of structural systems; survey of current structural design codes; supervision practices in structural construction.
Prerequisite: Graduate classification or approval of instructor.

ARCH 633 Applied Architectural Systems
Credits 3. 3 Lecture Hours.
Building energy consumption patterns and conservation strategies; natural and mechanical subsystems for environmental control; subsystem design criteria, economic considerations and selection methods.
Prerequisite: Graduate classification or approval of instructor; ARCH 335 or ARCH 615 or equivalents.*

ARCH 634 Architectural Lighting
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Attributes of the lighting environment, lighting and energy issues, daylight availability, building design for daylighting, heat loss control, solar shading, daylighting models, graphical analytical and computer methods of analysis, visual and lighting comfort evaluation, integration of daylight and electric light, energy analysis.
Prerequisite: Graduate classification or approval of instructor; ARCH 335 or equivalent.

ARCH 638 Architectural Theory—Renaissance Through 19th Century
Credits 3. 3 Lecture Hours.
Architectural Theory—Renaissance Through 19th Century. Review of architectural theory and practice from the 15th to 19th centuries with emphasis on the classical tradition, its transformations in France and in Great Britain and Germany; aspects of this evolution.
Prerequisite: Graduate classification or approval of instructor.

ARCH 639 Twentieth Century Architecture: Theory and Practice
Credits 3. 3 Lecture Hours.
Background and exploration of Modern Architecture, including consideration of region, materials, structure and style, as well as the social and economic factors that influence architectural form and content; discussion of the work and writings of 20th century architects and architectural theorists.
Prerequisite: Graduate classification or approval of instructor.
ARCH 640 Morphology of Architectural Form  
Credits 3. 3 Lecture Hours.  
Forces influencing structure and form of architecture: climate, culture, site, economics, construction methods.  
Prerequisite: Graduate classification or approval of instructor.

ARCH 643 Software Analysis for HVAC Systems in Low Energy Buildings  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Energy analysis (using Energy Plus software) with an emphasis on developing strategies for low energy use; simulation of various heating and cooling systems in low energy buildings; analysis of the mechanical equipment (including air handling systems, chiller and boilers), the building envelope, energy management control systems and indoor air quality.  
Prerequisite: ARCH 633 or equivalent.

ARCH 644 Seminar in Art and Architectural History  
Credits 3. 3 Lecture Hours.  
Advanced topics in art and architectural history emphasizing methods of analysis and development of theory, including case studies from both western and non-western traditions; topics vary each semester.  
Prerequisite: Graduate classification or approval of instructor.

ARCH 646 Historic Preservation Theory and Practice  
Credits 3. 3 Lecture Hours.  
History of the preservation movement in the U.S. Architectural and regulatory techniques employed in building preservation; case study of selected examples.  
Prerequisite: Graduate classification or approval of instructor.*

ARCH 647 Recording Historic Buildings  
Credits 5. 2 Lecture Hours. 9 Lab Hours.  
Techniques for recording historic buildings; measuring and drawing to Historic American Building Survey Standards; field experience in photography, field notes and record drawing preparation.  
Prerequisites: Graduate classification or approval of instructor.*

ARCH 648 Building Preservation Technology  
Credits 3. 3 Lecture Hours.  
Preservation technology related to the diagnosis and treatment of defects in buildings; case studies of significant historic structures. Field study may be required for which departmental fees may be assessed to cover costs.  
Prerequisite: ARCH 646 or approval of instructor.

ARCH 649 Advanced History of Building Technology  
Credits 3. 3 Lecture Hours.  
Readings and discussion of current topics in history of building technology; development of understanding the importance of materials of construction to the creation of historical forms of sacred architecture across faith and around the world.  
Prerequisite: Graduate classification or approval of instructor.

ARCH 653 Building Information Modeling in Architecture  
Credits 3. 3 Lecture Hours.  
Building Information Modeling (BIM); principles, methods and applications in the building lifecycle with a focus on the design process; includes computer-aided design, parametric modeling, databases, web technologies, design performance simulation and visualization.  
Prerequisites: Graduate classification or approval of instructor.

ARCH 655 Parametric Modeling in Design  
Credits 3. 3 Lecture Hours.  
Parametric modeling principles, methods and applications in environmental design and research; architectural geometry at basic and advanced levels; parametric equations and models; visual programming method; scripting method; constraints, rules and algorithms; elements and patterns of parametric design; parametric simulation; modeling tools.  
Prerequisite: Graduate classification or approval of instructor.

ARCH 657 Advanced Professional Practice and Ethics  
Credits 3. 3 Lecture Hours.  
Issues and relationships within the business, legal and political environment; legal forms of practice; office organization, personnel practices, policies and management; expanded services; economics of practice, profit planning and accounting; client selection; standard form agreements with consultants and for specialized services, risk management.  
Prerequisites: Graduate classification or approval of instructor.

ARCH 660 Design Programming  
Credits 3. 3 Lecture Hours.  
Study of successful programming approaches to meet user needs in design projects; history and definition of programming, programming techniques, documentation and case studies; applications to buildings, landscape projects and urban design.  
Prerequisite: Graduate classification or approval of instructor.

ARCH 663 Interior Architecture  
Credits 3. 3 Lecture Hours.  
Theory and application of design processes incorporating programming, space planning, analysis and communication of interior requirements for various building types with emphasis on spatial organization, selection of components and materials to satisfy user needs; emphasis on design of the workplace as the synthesis of human factors, organizational theory, systems technology and communication.  
Prerequisite: Graduate classification or approval of instructor.*

ARCH 666 Foundations of Research in Architecture  
Credits 3. 3 Lecture Hours.  
Introduction to the research process and its application to problems in architecture; survey of current literature on research design methods relevant to diverse architectural problems; qualitative and quantitative research strategies and techniques; communicating research results. May be taken two times for credit.  
Prerequisites: Graduate classification; concurrent enrollment in ARCH 681 and ARCH 690.

ARCH 673/LAND 632 Design for Active Living  
Credits 3. 3 Lecture Hours.  
Understanding the forms and characteristics of the built environment and the influence on human behaviors, lifestyles and health; theoretical and empirical insights into the issues of physical activity, obesity and automobile dependency; focus on how changes in the built environment help address these issues.  
Prerequisite: Graduate classification or approval of instructor.  
Cross Listing: LAND 632/PLAN 632.

ARCH 674 Typologies of Contemporary Hospital Design  
Credits 3. 3 Lecture Hours.  
Introduction to the contemporary planning of hospitals; comparisons of hospital design by contemporary practitioners; best practice models, repetitive patterns, and innovative designs.  
Prerequisite: Graduate classification or approval of instructor.
ARCH 675 Health Design and Research  
Credits 3. 3 Lecture Hours.  
Examination of health environments to include buildings, healthcare gardens and restorative landscapes, and urban design for home-based care and independent living; emphasis on research-informed approaches for patient-centered design that reduce stress and promote improved health outcomes.  
Prerequisite: Graduate classification or approval of instructor.

ARCH 676 Survey of Human Behavior and Design  
Credits 3. 3 Lecture Hours.  
Examination of human behavior and attitudes that influence spatial decision making; includes sections on environment and behavior, real estate finance, urban design decision making.  
Prerequisite: Graduate classification or approval of instructor.

ARCH 678 Foundations of Healthcare Design  
Credits 3. 3 Lecture Hours.  
Introduction to the theory of healthcare design over the course of time; exploration of the relationship of the medicine, science, art, and culture of each period with the design of buildings and environments for healthcare; emphasis on historic periods and the contemporary.  
Prerequisite: Graduate classification or approval of instructor.

ARCH 681 Seminar  
Credit 1. 1 Lecture Hour.  
Discussion and review of current practice in architecture and environmental design.  
Prerequisite: Graduate classification or approval of instructor.

ARCH 684 Professional Internship  
Credits 1 to 8. 1 to 8 Other Hours.  
Professional practice under approved arrangement with public or private agencies or in residence to complement academic coursework and to provide the basis for, and allow the preparation of, an appropriate report.  
Prerequisite: Graduate classification or approval of instructor and department head.

ARCH 685 Directed Studies  
Credits 1 to 6. 1 to 6 Other Hours.  
Individual problems involving application of theory and practice in design and construction of buildings and groups of buildings.  
Prerequisite: Graduate classification or approval of instructor and department head.

ARCH 689 Special Topics in...  
Credits 1 to 6. 1 to 6 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified field of architecture. May be repeated for credit.  
Prerequisite: Graduate classification or approval of instructor or department head.

ARCH 690 Research Ideologies for Architecture  
Credits 3. 3 Lecture Hours.  
Design of research in architecture; evaluation of research methodologies from current research literature.  
Prerequisite: Graduate classification or approval of instructor and department head.

ARCH 691 Research  
Credits 1 to 23. 1 to 23 Other Hours.  
Research for and preparation of dissertation.  
Prerequisite: Graduate classification or approval of instructor and department head.

ARCH 693 Professional Study  
Credits 1 to 23. 1 to 23 Other Hours.  
Application of verbal, graphic, research and critical thinking skills to an approved, individually selected architectural issue or design project that will advance the broad understanding of architecture and its impact on people. The terminal requirement for the Master of Architecture degree. May be taken more than once but not more than 6 hours used toward a degree.  
Prerequisites: ARCH 605, ARCH 606, ARCH 607; proposal approval.

ARTS - Art

Courses

ARTS 103 Design I  
Credits 3. 2 Lecture Hours. 4 Lab Hours.  
(ARTS 1304) Art History Survey II. Survey of architecture, painting, sculpture and the minor arts from prehistoric times to 14th century.

ARTS 104 Introduction to Graphic Design  
Credit 1. 2 Lab Hours.  
Introduction to the concepts and techniques utilized in the layout of graphic presentations; basic digital camera operations, typography, use of color, design principles; integration of type, graphic elements and images.  
Prerequisite: Major in visualization or minor in art.

ARTS 111 Drawing I  
Credits 3. 2 Lecture Hours. 4 Lab Hours.  
(ARTS 1311) Design I. Two-dimensional design; fundamentals of line, color, form, texture, shape, space and arrangement.

ARTS 115 Drawing for Visualization  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Investigation of and practice with tools, methods and techniques available for communication of designs; drawing, graphics, rendering and color.  
Prerequisite: Visualization majors only.

ARTS 149 Art History Survey I  
Credits 3. 3 Lecture Hours.  
(ARTS 1303) Art History Survey I. Survey of architecture, painting, sculpture and the minor arts from prehistoric times to 14th century.

ARTS 150 Art History Survey II  
Credits 3. 3 Lecture Hours.  
(ARTS 1304) Art History Survey II. Survey of architecture, painting, sculpture and the minor arts from the 14th century to the end of the 19th century.

ARTS 210 Introduction to Photography  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Introduction to the digital camera, creation, manipulation and critique of the digital image; composition and aesthetics; exposure control; digital workflow; post-processing techniques; layering and compositing; history of the photographic image.  
Prerequisite: Non-visualization majors only.

ARTS 212 Life Drawing  
Credits 3. 1 Lecture Hour. 6 Lab Hours.  
Emphasis on structure and action of the human figure.  
Prerequisite: ARTS 111 or ARTS 115 or equivalent, or approval of instructor and undergraduate program coordinator.
ARTS 303 Graphic Design I
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Introduction to the principles of graphic design; composition and their application for printed and digital media.
Prerequisites: ARTS 103, VIST 105, ENDS 105 or approval of instructor and undergraduate program coordinator.

ARTS 304 Graphic Design II
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Continuation of ARTS 303; concepts in advanced graphics as a tool for design solutions for publication and promotion; emphasis on creative thinking over technology.
Prerequisites: ARTS 303; junior or senior classification.

ARTS 305 Painting I
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Exploring potentials of painting media with emphasis on color and composition.
Prerequisite: ARTS 111 or ARTS 115 or approval of instructor and undergraduate program coordinator; junior or senior classification.

ARTS 308 Sculpture
Credits 3. 1 Lecture Hour. 5 Lab Hours.
Sculptural principles of physical form, space and materials; context and content of three-dimensional art forms.
Prerequisite: ARTS 115 or equivalent or approval of instructor and undergraduate program coordinator; junior or senior classification.

ARTS 311 Black and White Photography
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Exploration of vision through the photographic image as a medium of visual expression; basic theory and practice of black and white and/or still photography and/or digital imaging; historic development and aesthetic concern for photographic imagery.
Prerequisites: Approval of instructor and undergraduate program coordinator; junior or senior classification.

ARTS 312 Advanced Photography
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Advanced photographic image-making; development, control and presentation of the expressive photographic image; expression and criticism.
Prerequisite: ARTS 210, VIST 310 or ARTS 311.

ARTS 325 Digital Painting
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Theory and practice of digital painting media; exploration of traditional and new forms of art making and creativity; emphasis on color theory. Prerequisites: ARTS 103, ARTS 115 or equivalent; junior or senior classification. *Field trip required.

ARTS 329 Texas Art History
Credits 3. 3 Lecture Hours.
The development of visual arts in Texas; an examination of art movements, artists and major works exhibiting a broad range of artistic techniques.
Prerequisite: Junior or senior classification or approval of instructor and undergraduate program coordinator.

ARTS 330 The Arts of America
Credits 3. 3 Lecture Hours.
Survey of painting, sculpture, crafts and architecture of prehistoric America to the present; emphasis on art as a record of cultural, economic and social evolution.
Prerequisite: Junior or senior classification or approval of instructor and undergraduate program coordinator.

ARTS 335 The Art and Architecture of Rome
Credits 3. 3 Lecture Hours.
Rome as a microcosm of western civilization; a survey of western architectural and art history from antiquity through the Baroque; a focus on the Eternal City's buildings, paintings, mosaics and sculptures exploring criteria, methods, goals and results of major architectural and artistic movements and the people involved.
Prerequisite: Junior or senior classification or approval of instructor and undergraduate program coordinator.

ARTS 349 The History of Modern Art
Credits 3. 3 Lecture Hours.
Chronological development of late 19th through 20th century art; emphasis on key artists, paintings, sculpture, photography and architecture.
Prerequisite: Junior or senior classification or approval of instructor and undergraduate program coordinator.

ARTS 350 The Arts and Civilization
Credits 3. 3 Lecture Hours.
Investigation of the image of work of selected periods in terms of criticism, aesthetic rationale, specific masters and social significance by going beyond historical chronology.

ARTS 353 Color Theory
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Aspects of color and color theory including optical phenomena, color theory and perception; application and principles with respect to art and design; two-dimensional and three-dimensional projects examining color theories.
Prerequisites: College of Architecture majors or art minors; junior or senior classification.

ARTS 403 Graphic Design III
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Advanced graphic design concepts and practices; development of unified graphic campaigns to promote a product, an organization, a publication, a service, or business; advanced problem-solving techniques based on the design process through research, analysis, and presentation; systematic approach to visual development.
Prerequisites: ARTS 303 and ARTS 304; junior or senior classification or approval of instructor and undergraduate program coordinator; knowledge of industry-standard software (Adobe Photoshop, InDesign and Illustrator) is expected.

ARTS 445 Byzantine Art and Architecture
Credits 3. 3 Lecture Hours.
A critical and historical investigation of Mediterranean art and architecture from the third century to the middle of the fifteenth century; emphasis on the artistic achievements from the late antique Mediterranean and the Byzantine Empire; investigation of architectural decoration, public monuments, cultural diversity and controversies over images.
Prerequisite: Junior or senior classification.

ARTS 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Special problems in the fine and applied visual and plastic arts. May be repeated for up to 12 credit hours.
Prerequisite: Approval of instructor and undergraduate program coordinator.
AR TS 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified field of the fine or applied visual and plastic arts. May be repeated for up to 9 credit hours.  
Prerequisite: Approval of instructor and undergraduate program coordinator.

ASIA - Asian Studies

Courses

ASIA 285 Directed Studies  
Credits 0 to 4. 0 to 4 Other Hours.  
Selected fields of Asian Studies not covered in depth by other courses. Reports and extensive reading required. May be repeated for credit.  
Prerequisite: Approval of director of Asian Studies.

ASIA 289 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Special Topics in... Selected topics in Asian studies. May be repeated for credit.

ASIA 306/SOCI 306 Society and Population of Modern China  
Credits 3. 3 Lecture Hours.  
Major trends and current topics in social and demographic aspects of the society of modern China, including Taiwan.  
Prerequisite: Junior or senior classification.  
Cross Listing: SOCI 306/ASIA 306.

ASIA 325/SOCI 325 International Business Behavior  
Credits 3. 3 Lecture Hours.  
Theoretical models and practical protocols/behavior demands to conduct business and to work in France, Germany, Japan, China, Mexico and other countries; discussion of national character, managerial and negotiating styles.  
Prerequisite: Junior or senior classification.  
Cross Listing: SOCI 325/ASIA 325.

ASIA 329/SOCI 329 Pacific Rim Business Behavior  
Credits 3. 3 Lecture Hours.  
Theoretical models of Asian cultures and practical protocol/etiquette related to business and work in China, Thailand, South Korea, Japan, Australia, and other Pacific Rim nations; discussions of national character, managerial behavior and values.  
Prerequisite: Junior or senior classification.  
Cross Listing: SOCI 329/ASIA 329.

ASIA 330 Modern Mediterranean World  
Credits 3. 3 Lecture Hours.  
Critical examination of Mediterranean history; colonialism, industrialization, and other trans-national phenomena linking Africa, Asia, and Europe; social and political movements, migration, intellectual trends.  
Prerequisite: Junior or senior classification.

ASIA 335/ANTH 335 Cultures of Central Asia  
Credits 3. 3 Lecture Hours.  
Study of anthropological research in Central Asia: ecological adaptations; colonialism and post-colonialism; ethnic politics and ethnic conflict; religion and identity; gender and family; globalization and modernization.  
Prerequisite: Junior or senior classification.  
Cross Listing: ANTH 335/ASIA 335.

ASIA 349/HIST 349 The Vietnam War/The American War  
Credits 3. 3 Lecture Hours.  
Vietnam's relations with the West; French colonialism; origins and development of Vietnamese nationalism; Cold War and American involvement; wartime societies in North and South Vietnam; expansion of the war to Cambodia and Laos; anti-war movements in the United States; reasons for the American defeat; consequences and lessons of the war.  
Prerequisites: Junior or senior classification.  
Cross Listing: HIST 349/ASIA 349.

ASIA 350/HIST 350 Asia During World War II  
Credits 3. 3 Lecture Hours.  
The origins and development of Japanese imperialism; Japan's expansion into East and Southeast Asia; wartime societies and resistance; effects of the war in the United States upon Japanese-Americans; the outcomes of the war; remembrance of the war.  
Prerequisite: Junior or senior classification.  
Cross Listing: HIST 350/ASIA 350.

ASIA 351/HIST 351 Traditional East Asia  
Credits 3. 3 Lecture Hours.  
History and culture of China and Japan from earliest times to the coming of the West; impact of Confucianism and Buddhism; development of social, political and economic systems.  
Prerequisite: Junior or senior classification.  
Cross Listing: HIST 351/ASIA 351.

ASIA 352/HIST 352 Modern East Asia  
Credits 3. 3 Lecture Hours.  
Impact of the West on traditional China and Japan; the response through modernization; rise of nationalism and formation of modern nation states.  
Prerequisite: Junior or senior classification.  
Cross Listing: HIST 352/ASIA 352.

ASIA 354/HIST 354 Imperial China  
Credits 3. 3 Lecture Hours.  
History of imperial China from the earliest dynasties through the mid19th century, including major political events, the structure of Chinese government, economic development, philosophies and religion, wars and military and culture and daily life.  
Prerequisite: Junior or senior classification.  
Cross Listing: HIST 354/ASIA 354.

ASIA 355/HIST 355 Modern China  
Credits 3. 3 Lecture Hours.  
History of China from the coming of the West to the present; social, economic and political changes which have taken place during that period.  
Prerequisite: Junior or senior classification.  
Cross Listing: HIST 355/ASIA 355.

ASIA 356/HIST 356 Twentieth Century Japan  
Credits 3. 3 Lecture Hours.  
Industrialization and modernization of Japan; its rise from an isolated nation to a major world power and economic giant.  
Prerequisite: Junior or senior classification.  
Cross Listing: HIST 356/ASIA 356.

ASIA 358/HIST 358 Chinese Cultural History  
Credits 3. 3 Lecture Hours.  
Examination of Chinese culture and its evolution over the last 4,000 years; customs, art, literature, festivals, folklore, religion, architecture, medicine, and everyday life.  
Prerequisite: Junior or senior classification.  
Cross Listing: HIST 358/ASIA 358.
ASIA 360/ANTH 350 Archaeology of the Old World
Credits 3. 3 Lecture Hours.
Overview of archaeology and prehistory of Europe, Africa and Asia from
the evolution of the hominids to the development of agriculture and the rise
of civilization.
Prerequisite: Junior or senior classification.
Cross Listing: ANTH 350/ASIA 360.

ASIA 365/POLS 365 Asian Governments and Politics
Credits 3. 3 Lecture Hours.
Contemporary political systems of Asia, political institutions, actors and
processes.
Prerequisite: Junior or senior classification.
Cross Listing: POLS 365/ASIA 365.

ASIA 401 Slavery in World History
Credits 3. 3 Lecture Hours.
Comparative history of human slavery; slavery in the Ancient World, Asia,
Africa; varieties of modern slavery in the New World since 1500; abolition
of slavery and continuing forms of human bondage in the contemporary
world.
Prerequisite: Junior or senior classification.
Cross Listing: AFST 401 and HIST 401.

ASIA 463 Gender in Asia
Credits 3. 3 Lecture Hours.
Gender dynamics in Asia; changes in gender roles; women's movements;
women and the economy; women and politics; men's and women's private
lives.
Prerequisite: Junior or senior classification.
Cross Listing: AFST 401 and HIST 401.

ASIA 485 Directed Studies
Credits 1 to 3. 1 to 3 Other Hours.
Selected fields of Asian Studies not covered in depth by other courses.
Reports and extensive reading required. May be repeated for credit.
Prerequisite: Approval of director of Asian Studies.

ASIA 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Special Topics in... Selected topics in asian studies. May be repeated for credit.

ASIA 491 Research
Credits 1 to 3. 1 to 3 Other Hours.
Research conducted under the direction of a faculty member in asian
studies. May be repeated 3 times for credit.
Prerequisites: 6 credits of ASIA; junior or senior classification; approval of
instructor.

ASTR - Astronomy

Courses

ASTR 101 Basic Astronomy
Credits 3. 3 Lecture Hours.
(ASTR 1303) Basic Astronomy. A qualitative approach to basic stellar
astronomy; earth-moon-sun relationships then studies of distances to
stars, stellar temperatures, and other physical properties; birth, life on the
main sequence of the H-R diagram, and ultimate fates of stars; not open to
students who have taken ASTR 111 or ASTR 314.

ASTR 102 Observational Astronomy
Credit 1. 3 Lab Hours.
Observational and laboratory course which may be taken in conjunction
with ASTR 101 or ASTR 314. Use of techniques and instruments of
classical and modern astronomy.
Prerequisite: ASTR 101 or ASTR 314, or registration therein.

ASTR 109/PHYS 109 Big Bang and Black Holes
Credits 3. 3 Lecture Hours.
Designed to give an intuitive understanding of the Big Bang and Black
Holes, without mathematics, and de-mystify them for the non-scientist.

ASTR 111 Overview of Modern Astronomy
Credits 4. 3 Lecture Hours. 2 Lab Hours.
(ASTR 1303, and 1103, ASTR 1403) Overview of Modern Astronomy.
Roots of modern astronomy; the scientific method; fundamental physical
laws; the formation of planets, stars, and galaxies; introduction to
cosmology; includes an integrated laboratory that reinforces the lecture
topics, including hands-on experience with telescopes and imaging of
celestial objects; not open to students who have taken ASTR 101 or ASTR
314.

ASTR 119/PHYS 119 Big Bang and Black Holes: Laboratory Methods
Credit 1. 2 Lab Hours.
Hands-on understanding of the concepts surrounding the Big Bang and
Black Holes; emphasis on the evidence-based decision making process,
methods and presentation; for non-scientists. Companion course for ASTR
Prerequisite: ASTR/PHYS 109/ASTR 109 or registration therein.
Cross Listing: PHYS 119/ASTR 119.

ASTR 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Special work in laboratory or theory to meet individual requirements in
cases not covered by regular curriculum; intended for use as lower-level
credit.
Prerequisite: Approval of department head.

ASTR 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Special Topics in... Selected topics in an identified area of astronomy. May
be repeated for credit.
Prerequisite: Approval of instructor.

ASTR 291 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in astronomy.
May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of
instructor.

ASTR 314 Survey of Astronomy
Credits 3. 3 Lecture Hours.
Primarily for majors in science and engineering. Kepler's laws, law
of gravitation, solar system, stars, stellar evolution, nucleosynthesis,
cosmology, clusters, nebulae, pulsars, quasars, black holes.
Prerequisite: PHYS 208.

ASTR 320 Astrophysical Research Methods
Credits 2. 2 Lecture Hours.
Background and tools used by astronomical researchers in performing
analyses; topics include reduction of photometric and spectroscopic
data, bivariate and multivariate statistical methods and chi-squared
minimization.
Prerequisites: MATH 171 and MATH 172.
Course Descriptions

ASTR 401 Stars and Extrasolar Planets
Credits 3. 3 Lecture Hours.
How stars are born, how internal structure changes, nuclear fuel burned and ultimate fate; extrasolar planets: detection, formation, properties and habitability.
Prerequisite: ASTR 314.

ASTR 403 Extragalactic Astronomy and Cosmology
Credits 3. 3 Lecture Hours.
Physical makeup of individual galaxies and large scale structure in the universe; origin and eventual fate of the universe; interpretation of observational data as it relates to baryonic matter, Dark Matter and cosmological models with Dark Energy.
Prerequisite: ASTR 314.

ASTR 485 Directed Studies
Credits 1 to 12. 1 to 12 Other Hours.
Special work in laboratory or theory to meet individual requirements in cases not covered by regular curriculum.
Prerequisite: Approval of department head.

ASTR 489 Special Topics in...
Credits 1 to 4. 0 to 4 Lecture Hours. 0 to 4 Lab Hours.
Special Topics in... Selected topics in an identified topic of astronomy. May be repeated for credit.
Prerequisite: Approval of instructor.

ASTR 491 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in astronomy. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor.

ASTR 601/PHYS 641 Extragalactic Astronomy
Credits 3. 3 Lecture Hours.
Overview of observations of galaxies and large-scale structures in the Universe to understand their formation and evolution from theoretical and observational perspectives; galaxy luminosity functions; evolution of stellar populations and chemical enrichment; clusters and AGN.
Prerequisites: PHYS 601; or ASTR 314 and PHYS 302; or approval of instructor.
Cross Listing: PHYS 641/ASTR 601.

ASTR 602/PHYS 642 Astronomical Observing Techniques and Instrumentation
Credits 3. 3 Lecture Hours.
Theory and practice of obtaining and analyzing astrometric, photometric, spectroscopic, and interferometric measurements of astronomical sources across the electromagnetic spectrum; principles of design, fabrication, assembly, test, deployment, and use of astronomical instruments.
Prerequisites: PHYS 615 or equivalent; or approval of instructor.
Cross Listing: PHYS 642/ASTR 602.

ASTR 603/PHYS 643 Stellar Astrophysics
Credits 3. 3 Lecture Hours.
Theoretical and observational aspects of stellar astrophysics; thermodynamic properties of stellar interiors; energy sources; nuclear processes and burning stages; convective and radiative energy transport; evolutionary models; atmospheres; stability and pulsations; chemical enrichment processes; population synthesis.
Prerequisites: PHYS 606 and PHYS 607 or equivalents; or approval of instructor.
Cross Listing: PHYS 643/ASTR 603.

ASTR 604/PHYS 644 Cosmology
Credits 3. 3 Lecture Hours.
Basic principles of modern cosmology and particle physics; general relativity; cosmic inflation; Big Bang nucleosynthesis; expansion of the universe; cosmic microwave background; large-scale structure of the Universe; properties of particles; dark matter; dark energy.
Prerequisites: PHYS 615 or equivalent; or approval of instructor.
Cross Listing: PHYS 644/ASTR 604.

ASTR 605/PHYS 645 Galactic Astronomy
Credits 3. 3 Lecture Hours.
Basic nature and structure of constituents of Milky Way galaxy; distribution and motions of stars and gas; origin evolution and distribution of large-scale chemical abundances and kinematic patterns across populations; models of galaxy formation and implications of modern observations.
Prerequisites: PHYS 601 and PHYS 607 or equivalents; or approval of instructor.
Cross Listing: PHYS 645/ASTR 605.

ASTR 606/PHYS 646 Radiative Transfer
Credits 3. 3 Lecture Hours.
Fundamental radiative processes in stellar and planetary atmospheres; radiative fields; Stokes parameters; Mueller matrix formalism; radiation from moving charges; Compton scattering; plasma effects; atomic structure and radiative transitions; molecular structure and spectra; multiple scattering.
Prerequisites: PHYS 302, PHYS 304, PHYS 408, and PHYS 412 or equivalents; or approval of instructor.
Cross Listing: PHYS 646/ASTR 606.

ASTR 681 Seminar
Credit 1. 1 Lecture Hour.
Subjects of current importance; normally required of all graduate students in astronomy. May be repeated for credit.

ASTR 685 Directed Studies
Credits 1 to 9. 1 to 9 Other Hours.
Individual problems not related to thesis.
Prerequisite: Approval of instructor.

ASTR 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Special Topics in... Selected topics in an identified area of astronomy. May be repeated for credit.
Prerequisite: Approval of instructor.

ASTR 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research toward thesis or dissertation.
Prerequisite: Baccalaureate degree in physics or equivalent.

ATMO - Atmospheric Sciences

Courses

ATMO 201 Weather and Climate
Credits 3. 3 Lecture Hours.
Structure, energy, and motions of the atmosphere; climate; fronts and cyclones; atmospheric stability; clouds and precipitation; severe storms.
ATMO 202 Weather and Climate Laboratory
Credit 1. 2 Lab Hours.
Practical laboratory experiments and exercises, conducted in the meteorology and computer laboratories, concerning the fundamental physical processes underlying atmospheric phenomena, and the collection, display and interpretation of meteorological information. For non-majors only.

ATMO 203 Weather Forecasting Laboratory
Credit 1. 2 Lab Hours.
Short-range weather forecasting practice; numerical guidance; weather map analysis and discussions.
Prerequisite: Concurrent enrollment in ATMO 201.

ATMO 251 Weather Observation and Analysis
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Standard and experimental weather observing techniques; subjective and objective analysis; application of conceptual models; simple kinematic and dynamic constraints.
Prerequisite: ATMO 203 or registration therein.

ATMO 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Offered to enable majors in meteorology to undertake and complete with credit in their particular fields of specialization limited investigations not covered by any other courses in established curriculum.
Prerequisite: Freshman or sophomore classification.

ATMO 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of meteorology. May be repeated for credit.
Prerequisite: Approval of instructor.

ATMO 291 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in atmospheric sciences. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Freshman or sophomore classification and approval of instructor.

ATMO 301 Computer Applications in the Atmospheric Sciences
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Introductions to technical computing methods in the atmospheric sciences; use of specialized software and data analysis systems for meteorological applications.

ATMO 324 Physical and Regional Climatology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Climate causes; global and surface energy balance; hydrologic cycle; general circulation; climate change; climate data analysis.
Prerequisites: ATMO 201 and ATMO 203; MATH 308 or registration therein or approval of instructor; ATMO 321 or equivalent; junior or senior classification.

ATMO 326 Environmental Atmospheric Science
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Basic concepts of meteorology as needed in architectural and engineering fields; patterns of climatic elements and their application to practical problems in building and urban sciences; practical experience in use of instruments to measure cryptoclimates of buildings as they relate to outside conditions and analysis of data.

ATMO 335 Atmospheric Thermodynamics
Credits 3. 3 Lecture Hours.
Application of thermodynamics to Earth's atmosphere; phase changes of water; stability concepts; introduction to physical chemistry.
Prerequisites: CHEM 102; MATH 251; PHYS 218.

ATMO 336 Atmospheric Dynamics
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Kinematic concepts and relationships; equations of motion; geostrophic and accelerated motions; the vorticity equation and Rossby waves.
Prerequisites: ATMO 335 or registration therein; MATH 308 or registration therein; junior or senior classification.

ATMO 352 Severe Weather and Mesoscale Forecasting
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Parcel theory for dry and moist convection; sounding diagrams and their application to atmospheric convection; organization of midlatitude convection and severe weather; thunderstorm forecasting.
Prerequisite: MATH 152 or MATH 172.

ATMO 363 Introduction to Atmospheric Chemistry and Air Pollution
Credits 3. 3 Lecture Hours.
Descriptive introduction of the composition and chemistry of natural and pollutant compounds in the atmosphere; transport, cycling and reactivity of atmospheric material; atmospheric measurements, data processing, air quality and human health issues; air pollution trends and climate change.
Prerequisites: CHEM 101 and CHEM 102 or approval of instructor.

ATMO 435 Synoptic-Dynamic Meteorology
Credits 3. 3 Lecture Hours.
Dynamics and diagnosis of synoptic-scale systems; perturbation theory and baroclinic instability; wave energetics, frontogenes.
Prerequisites: ATMO 336 or equivalent; MATH 308.

ATMO 441 Satellite Meteorology and Remote Sensing
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Introduction to satellite orbit dynamics, atmospheric radiative transfer, atmospheric remote sensing methods, and analysis and application of remotely sensed meteorological data.
Prerequisites: ATMO 324, MATH 308; junior or senior classification.

ATMO 443 Radar Meteorology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Principles of radar theory, hardware, operations and analysis using real-time radar and computer-based case studies; conventional, Doppler and polarimetric weather radar; precipitation estimation, hydrometeor identification and air motion analysis; observations and analyses of thunderstorms, mesocyclones, tornadoes and gust fronts.
Prerequisites: ATMO 352; PHYS 208.

ATMO 446 Physical Meteorology
Credits 3. 3 Lecture Hours.
Physics and meteorology of clouds and precipitation; atmospheric electricity; radiative transfer.
Prerequisite: ATMO 335.

ATMO 455 Numerical Weather Prediction
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Basic principles of computer models of the atmosphere; parameterizations; use and critical evaluation of models and model output.
Prerequisites: MATH 308; ATMO 336 or registration therein.
ATMO 456 Practical Weather Forecasting  
Credits 3. 1 Lecture Hour. 4 Lab Hours.  
Advanced weather forecasting techniques with application to a variety of forecasting problems, both public and private sector.  
Prerequisites: ATMO 435 or registration therein; junior or senior classification.

ATMO 459 Tropical Meteorology  
Credits 3. 3 Lecture Hours.  
Tropical climatology; structure, evolution, and motion of tropical cyclones; tropical cyclone hazards; large-scale tropical phenomena.  
Prerequisites: ATMO 336; ATMO 352 or registration therein.

ATMO 461 Broadcast Meteorology  
Credit 1. 2 Lab Hours.  
Instruction in the practice of broadcast meteorology; practice in and preparation of weather forecast products and demonstration videotapes. May be taken two times for credit with faculty advisor approval.  
Prerequisites: ATMO 335 or registration therein; MATH 308 or registration therein; junior or senior classification.

ATMO 463 Air Pollution Meteorology  
Credits 3. 3 Lecture Hours.  
Problems of air pollution in our global atmosphere; environmental cycles; waste products in the biosphere; atmospheric pollution; natural concentrations of atmospheric constituents; pollution sources; atmospheric transport; pollution sinks; effects of pollution; monitoring and surveillance; and management of air quality.  
Prerequisite: ATMO 363 or approval of instructor; junior or senior classification only.

ATMO 464 Laboratory Methods in Atmospheric Sciences  
Credits 3. 2 Lecture Hours. 4 Lab Hours.  
Instruction in chemical techniques used to monitor the atmosphere and other earth systems; sampling strategies; survey of current literature focusing on development of new techniques.  
Prerequisites: CHEM 101 and one semester of calculus (MATH 171 or equivalent).

ATMO 484 Internship  
Credits 0 to 3. 0 to 3 Other Hours.  
Supervised internship at National Weather Service or in broadcast meteorology or elsewhere with faculty advisor approval; must complete a report and have a letter from supervisor for credit. Must be taken on a satisfactory/unsatisfactory basis. May be taken three times for credit.  
Prerequisites: ATMO 251; approval of faculty advisor.

ATMO 485 Directed Studies  
Credits 1 to 23. 1 to 23 Other Hours.  
Offered to enable majors in meteorology to undertake and complete with credit in their particular fields of specialization limited investigations not covered by any other courses in established curriculum.  
Prerequisite: Junior or senior classification.

ATMO 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of meteorology. May be repeated for credit.

ATMO 491 Research  
Credits 0 to 4. 0 to 4 Other Hours.  
Research conducted under the direction of faculty member in atmospheric sciences. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.  
Prerequisites: Junior or senior classification and approval of instructor.

ATMO 601 Fundamentals of Atmospheric Dynamics  
Credits 3. 3 Lecture Hours.  
Basic concepts of fluid dynamics; meteorological approximations and coordinate systems; simple models and wave motion; barotropic models.  
Prerequisite: Approval of instructor.

ATMO 602 Atmospheric Physics I  
Credits 3. 3 Lecture Hours.  
Integrated treatment of the dry and moist thermodynamics of the atmosphere, and cloud and precipitation microphysics.

ATMO 603 Quantitative Methods for the Atmospheric Sciences  
Credits 3. 3 Lecture Hours.  
Mathematical and numerical methods applied to ODE's, PDE's and statistical methods; methods of analysis and modeling of atmospheric phenomena.  
Prerequisites: Concurrent registration in ATMO 601 and CSCE 203 or equivalents.

ATMO 604 General Circulation and Climate  
Credits 3. 3 Lecture Hours.  
Observed large scale circulation and climate of the earth; physical processes which maintain relevant budgets; models and theories explaining mean observations.  
Prerequisite: ATMO 601.

ATMO 606 Atmospheric Chemistry I  
Credits 3. 3 Lecture Hours.  
Fundamentals of atmospheric chemistry; tropospheric ozone, NOX and HOX cycling, sulfur chemistry, stratospheric chemistry, and aerosol composition; analytical measurement methods; review of chemical basics as needed.

ATMO 611 Atmospheric Dynamics II  
Credits 3. 3 Lecture Hours.  
Continuation of ATMO 601; flow in planetary boundary layer; balanced flows; atmospheric instabilities; tropical dynamics.  
Prerequisite: ATMO 601 or approval of instructor.

ATMO 612 Atmospheric Physics II  
Credits 3. 3 Lecture Hours.  
Continuation of ATMO 602. Radiative transfer into the atmosphere.  
Prerequisite: ATMO 602.

ATMO 613 Advanced Atmospheric Chemistry  
Credits 3. 3 Lecture Hours.  
An advanced survey of fundamental atmospheric processes involving biogeochemical cycles, air pollution, tropospheric chemistry, atmospheric aerosols and stratospheric chemistry.  
Prerequisite: ATMO 606.

ATMO 629 Climate Change  
Credits 3. 3 Lecture Hours.  
Climate of the geological and recent past; methods of assessing climate and climatic change; mechanisms, models, theories, impact and prediction of climatic change.  
Prerequisites: ATMO 324 or equivalent; approval of instructor.

ATMO 631 Climate Modeling  
Credits 3. 3 Lecture Hours.  
A study of mathematical models used in the simulation of climate. Development and structure of selected members of the hierarchy of models ranging from energy balance models to general circulation models. Applications to paleoclimate and future climate scenarios.  
Prerequisite: Approval of instructor.
ATMO 62 Statistical Methods in Climate Research
Credits 3. 3 Lecture Hours.
Advanced techniques especially applicable to climatology; space-time random field analysis applied to stochastic models, parameter estimation, statistical forecasting, data interpolation and signal detection; applications to real data and climate model output.
Prerequisites: STAT 601 or equivalent; approval of instructor.

ATMO 636 Dynamic Meteorology
Credits 3. 3 Lecture Hours.
General circulation; stratospheric dynamics; tropical systems.
Prerequisite: ATMO 611.

ATMO 638 Dynamics of Convective Clouds
Credits 3. 3 Lecture Hours.
Parcel, slice and entrainment concepts; bubble and plume theories; spherical vortex; the starting plume; one-dimensional models; selected topics of current interest.
Prerequisite: ATMO 611.

ATMO 645 Cloud and Precipitation Physics
Credits 3. 3 Lecture Hours.
Physics of atmospheric condensation nuclei, ice in the atmosphere; precipitation processes; artificial modification of clouds; precipitation.
Prerequisite: ATMO 612 or approval of instructor.

ATMO 655 Satellite Data in Meteorology
Credits 3. 3 Lecture Hours.
Meteorological satellite programs of the United States and other countries; theory of meteorological measurements from artificial satellites; applications of satellite data in determinations of atmospheric structure and in forecasting; recent and current research studies; future programs.
Prerequisite: ATMO 251 or approval of instructor.

ATMO 656 Tropical Meteorology
Credits 3. 3 Lecture Hours.
Role of the tropics in global circulation; structure and dynamics of the tropical zone; local and diurnal phenomena; synoptic components; tropical cyclones; role of cumulus-scale convection; current topics.
Prerequisite: ATMO 251 or approval of instructor.

ATMO 657 Mesometeorology
Credits 3. 3 Lecture Hours.
Theory and structure of mesoscale weather systems and their relation to larger and smaller scale systems.
Prerequisite: ATMO 251 or approval of instructor.

ATMO 658 Synoptic Meteorology
Credits 3. 3 Lecture Hours.
Mechanism and energetics of general circulation. Structure of large-scale systems. Persons desiring practice in analysis techniques should enroll for 1 hour or more of ATMO 685.
Prerequisite: ATMO 251 or approval of instructor.

ATMO 659 Tropical Cyclones
Credits 3. 3 Lecture Hours.
Tropical climatology; structure evolution and motion of tropical cyclones; tropical cyclone hazards; large scale tropical phenomena.
Prerequisite: ATMO 251.

ATMO 661 Atmospheric Turbulence
Credits 3. 3 Lecture Hours.
Classical turbulence theories and statistical approaches; closure models; effects of rotation and stratification; interpretations of atmospheric observations.
Prerequisite: ATMO 611 or suitable background in fluid dynamics.

ATMO 664 Laboratory Methods in Atmospheric and Environmental Sciences
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Classroom and laboratory course; introduction to chemical techniques used to monitor the atmosphere and environment; instrumentation, sampling strategies; survey of current literature focusing on development of new techniques.
Prerequisite: Graduate classification.

ATMO 677/OCNG 677 Geophysical Data Assimilation
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Modern data assimilation methods applied to oceanic and atmospheric circulation models, as well as in other simple models; methods to interpolate one-, two-, and three-dimensional randomly spaced data to regular grids for use in numerical models of atmospheric and oceanic circulation.
Prerequisites: OCNG 657, ATMO 632, STAT 601.
Cross Listing: OCNG 677/ATMO 677.

ATMO 681 Seminar
Credit 1. 1 Other Hour.
Presented by students and faculty based upon their research work and upon surveys of the literature.

ATMO 685 Directed Studies
Credits 1 to 16. 1 to 16 Other Hours.
Offered to enable majors in meteorology to undertake and complete, with credit, in their particular fields of specialization, limited investigations not covered by any other courses in established curriculum.

ATMO 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Special topics in an identified area of meteorology. May be repeated for credit.

ATMO 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
For thesis or dissertation. Topic subject to approval of department head.

BAEN - Biological & Ag Engr

Courses

BAEN 150 Introduction to Biological and Agricultural Engineering Design
Credit 1. 2 Lab Hours.
Introduction to the engineering design process using design problems presented by biological and agricultural engineers from industry; problem definition, information search, idea generation and development of design concepts.
Prerequisite: Engineering major or approval of department head.

BAEN 201 Analysis of Biological and Agricultural Engineering Problems
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Overview of Biological and Agricultural Engineering discipline through case studies and contemporary problems; introduction to computer programming; engineering analysis and problem solving using computer programming.
Preliminary requirements: ENGR 111; MATH 151; CHEM 107 and CHEM 117 or BIOL 113 or PHYS 218.
BAEN 281 Professional Development Seminar
Credit 1. 1 Lecture Hour.
Familiarization with engineering design process used in professional environments where BAEN and AGSM graduates are employed; discussion of professional development topics; improvement of technical communication skills. May be taken 4 times for credit.

BAEN 285 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Selected problems in any phase of agricultural engineering; credit and specific content dependent upon background, interest, ability and needs of student enrolled; individual consultations and reports required.
Prerequisites: Freshman or sophomore classification; approval of department head.

BAEN 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of agricultural engineering. May be repeated for credit.
Prerequisite: Approval of instructor.

BAEN 291 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the direction of faculty member in biological and agricultural engineering.
Prerequisites: Freshman or sophomore classification and approval of instructor.

BAEN 301 Biological and Agricultural Engineering Fundamentals I
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Fundamental engineering concepts related to agricultural systems including the environment (soil, water, and air), plant and animal production systems and processing, and associated machines and facilities; application of techniques for data collection and analysis to problems in biological and agricultural engineering; design of experiments and communication of experimental results.
Prerequisite: MEEN 221 or registration therein.

BAEN 302 Biological and Agricultural Engineering Fundamentals II
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Fundamentals of microbiology and biochemistry as they apply to biological and agricultural engineering systems to produce useful products and/or benign wastes; topics include microbiology, chemistry of biomolecules, microbial metabolism, bioenergetics, kinetics, mass transfer, bioreactor design, bioprocesses, and downstream processing.
Prerequisites: BIOL 113; CHEM 222 or registration therein.

BAEN 320 Engineering Thermodynamics
Credits 3. 2 Lecture Hours. 2 Lab Hours.
First and second laws of thermodynamics; properties of pure substances; analysis of closed and open systems; applications to steady-flow and non-flow processes; power and refrigeration cycles; psychrometrics.
Prerequisites: MEEN 221; MATH 251 or registration therein; junior or senior classification.

BAEN 340 Fluid Mechanics
Credits 3. 3 Lecture Hours.
Fundamentals of fluid properties; basic conservation principles of momentum, energy and continuity; flow through closed conduits; open channel flow; principles of turbomachines and compressible flow.
Prerequisites: MEEN 221; BAEN 320; junior classification.

BAEN 354 Engineering Properties of Biological Materials
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Relationships between composition, structure and properties of biological materials; definition and measurement of mechanical, physical, thermal and other material properties; variability of properties; application of properties to engineering analysis and design of biological and agricultural processes and systems.
Prerequisite: MEEN 222.

BAEN 365 Unit Operations for Biological and Agricultural Engineering
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Theoretical and practical understanding of basic unit operations required to design processes and equipment in the agricultural, biological, environmental, and food industries, with unique constraints presented by biological and agricultural systems considered in design of all units.
Prerequisites: BAEN 340; CVEN 305 or registration therein; junior or senior classification.

BAEN 366 Transport Processes in Biological Systems
Credits 3. 3 Lecture Hours.
Basic principles governing transport of energy and mass; application of these principles to analysis and design of processes involving biological, environmental and agricultural systems.
Prerequisites: BAEN 340; BAEN 354; BAEN 365 or registration therein; MATH 308; junior or senior classification.

BAEN 370 Measurement and Control of Biological Systems and Agricultural Processes
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Theory and application of sensors and techniques in the design of systems for automatic control in biological systems and agricultural production and processing; sensor operation; signal processing; control techniques; automation and robotics.
Prerequisite: ECEN 215.

BAEN 375 Design Fundamentals for Agricultural Machines and Structures
Credits 3. 3 Lecture Hours.
Applications of stress/strain relationships and failure theory to the design of agricultural machines and structures; structural properties of engineering materials; finite element analysis and computer aided engineering design.
Prerequisite: CVEN 305.

BAEN 379 Renewable Energy Conversions
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Energy/power systems through engineering and technical aspects of quantifying and designing the suitability of several types of renewable energy resources; new insights of vast resources that future engineers can harness to augment diminishing supplies of nonrenewable energy.
Prerequisite: BAEN 320, BAEN 366 or equivalent, or approval of instructor.
BAEN 417 Fundamentals of Nanoscale Biological Engineering
Credits 3. 3 Lecture Hours.
Nanostructures, nanofabrication methods, instrumentation and applications pertinent to Biological, Food and Bioenergy systems; identification and utilization of key tools available for fabricating, manipulating and analysis of nanostructures used in biological engineering applications.
Prerequisite: Senior classification in engineering or approval of instructor.

BAEN 422/CHEN 422 Unit Operations in Food Processing
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Design of food process engineering systems; basic concepts of rheology and physical properties of foods; fundamentals of heat and mass transfer and process control.
Prerequisites: CHEN 205 and 304, or CVEN 305.
Cross Listing: CHEN 422/BAEN 422.

BAEN 427 Engineering Aspects of Packaging
Credits 3. 3 Lecture Hours.
Introduction to properties and engineering aspects of materials for use as components of a package and/or packaging system; principles of design and development of packages; evaluation of product-package-environment interaction mechanisms; testing methods; environmental concerns; regulations.
Prerequisite: Senior classification or approval of instructor.

BAEN 460 Principles of Environmental Hydrology
Credits 3. 3 Lecture Hours.
Hydrologic cycle; precipitation, evaporation, evapotranspiration, infiltration, percolation, runoff, streamflow; groundwater and surface water flow; transport of contaminants in surface water; measurement and analysis of hydrologic data for engineering design.
Prerequisites: BAEN 340; senior classification.

BAEN 464 Irrigation and Drainage Engineering
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Engineering principles and design of both surface and pressurized irrigation systems; introduction to the design of surface and subsurface drainage systems including crop water requirements, soil moisture, irrigation scheduling, surface irrigation, sprinkler irrigation, trickle irrigation, pumps, pipelines, irrigation canals, irrigation wells, and surface and subsurface drainage.
Prerequisite: BAEN 340.

BAEN 465 Design of Biological Waste Treatment Systems
Credits 3. 3 Lecture Hours.
Management and treatment of high organic content wastes streams, with emphasis on agricultural, municipal, and agro-industry wastewater; engineering design of biological waste treatment processes; resource recovery from waste streams; recycle and reuse of finished effluents.
Prerequisites: BAEN 302; BAEN 340; junior or senior classification or approval of instructor.

BAEN 468 Soil and Water Conservation Engineering
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Engineering principles of soil and water conservation; open channel flow principles, hydraulic grade stabilization, erosion control, storm water management, design of structures for floodwater routing, culvert design, design of waterways and agricultural reservoirs, stream bank protection, water quality assessment, groundwater flow, surface water modeling.
Prerequisites: BAEN 340; CVEN 305.

BAEN 469 Water Quality Engineering
Credits 3. 3 Lecture Hours.
Nonpoint source pollution processes including transport mechanisms and contaminant fate; design of best management practices for abating nonpoint source pollution.
Prerequisites: BAEN 340 or equivalent; CVEN 305.

BAEN 471/CHEN 471 Bioreactor Engineering
Credits 3. 3 Lecture Hours.
Fundamentals of microbial and enzyme kinetics; basic biochemical reaction theory and reactor systems; heterogeneous reactions and transport considerations in enzyme and cell reactors, and immobilized systems; bioreactor design considerations in bioprocessing.
Prerequisite: CHEN 282 or CHEN 382 or BAEN 302; junior or senior classification in engineering or approval of instructor.
Cross Listing: CHEN 471/BAEN 471.

BAEN 477 Air Pollution Engineering
Credits 3. 3 Lecture Hours.
Design of air pollution abatement equipment and systems to include cyclones, bag filters and scrubbers; air pollution regulations; permitting; dispersion modeling; National Ambient Air Quality Standards.
Prerequisite: CVEN 305 or equivalent.
Cross Listing: MEEN 477 and SENG 477.

BAEN 479 Biological and Agricultural Engineering Design I
Credits 3. 3 Lecture Hours.
Capstone design project selection from problems posed by biological and agricultural engineers in industrial practice; completion of project feasibility study and outline; design philosophy, teamwork and communication; economics; product liability and reliability; use of standards and codes; goal setting, professional development, and time management; project to be completed in BAEN 480.
Prerequisites: BAEN 340 and BAEN 365; BAEN 366 or BAEN 370.

BAEN 480 Biological and Agricultural Engineering Design II
Credits 3. 6 Lab Hours.
Continuation of engineering design experience through team solution of design problem developed in BAEN 479; preparation of design solution under supervision of biological and agricultural engineering staff and clients; critical evaluation of results by students; staff and industrial consultants.
Prerequisites: BAEN 479; senior classification.

BAEN 481 Seminar
Credit 1. 1 Other Hour.
Review of current literature dealing with agricultural engineering problems presented by staff members and students.
Prerequisite: Senior classification.

BAEN 485 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Selected problems in any phase of agricultural engineering. Individual consultations and reports required.
Prerequisites: Junior or senior classification and approval of department head.

BAEN 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 1 to 4 Lab Hours.
Special topics in an identified area of agricultural engineering. May be repeated for credit.
Prerequisite: Approval of department head.
BAEN 491 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the direction of faculty member in biological and agricultural engineering. May be repeated 2 times for credit. Registration in multiple sections of this course are possible within a given semester provided that the per semester credit hour limit is not exceeded. 
Prerequisites: Junior or senior classification and approval of instructor.

BAEN 601 Advanced Agricultural Systems Analysis
Credits 3. 3 Lecture Hours.
Application of operations research tools and techniques to the analysis and management of technical systems in agriculture; optimization techniques applied to materials handling, supply chain logistics and other food and agricultural applications.
Prerequisite: AGSM 301 or approval of instructor.

BAEN 614 Renewable Energy Conversions
Credits 3. 2 Lecture Hours. 1 Lab Hour.
Managing energy/power systems through engineering and technical aspects of quantifying and designing the suitability of several types of renewable energy resources; providing new insights of vast resources that future engineers can harness to augment diminishing supplies of non-renewable energy.
Prerequisites: BAEN 320, BAEN 366 or equivalent; or approval of instructor.

BAEN 617 Fundamentals of Nanoscale Biological Engineering
Credits 3. 3 Lecture Hours.
The course will primarily cover nanostructures, nanofabrication methods, instrumentation and applications pertinent to Biological, Food and Bioenergy systems and will provide students an opportunity to identify and utilize key tools available for fabricating, manipulating and analysis of nanostructures used in Biological Engineering applications.
Prerequisite(s): Graduate classification in engineering.

BAEN 620 Food Rheology
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Principles of elasticity, viscous flow and visco-elasticity applied to solid and liquid food materials; experimental determination of rheological properties using fundamental methods and empirical textural measurements; applications to food engineering research, textural measurement and quality control.
Prerequisites: FSTC 315/AGSM 315; PHYS 201; graduate classification.

BAEN 622 Unit Operations in Food Processing
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Design of food process engineering systems; basic concepts of rheology and physical properties of foods; fundamentals of heat and mass transfer and process control.
Prerequisites: Fluid Mechanics, Thermodynamics, Fluid Dynamics.

BAEN 625 Advances in Food Process Engineering
Credits 3. 3 Lecture Hours.
Application of engineering fundamentals to the design of novel/advanced food processing systems including food irradiation, advances in thermal process, food freezing, food dehydration.
Prerequisite: Graduate classification.

BAEN 627 Engineering Aspects of Packaging
Credits 3. 3 Lecture Hours.
Introduction to properties and engineering aspects of materials for use as components of a package and/or packaging system; principles of design and development of packages; evaluation of product-package-environment interaction mechanisms; testing methods; environmental concerns; regulations.
Prerequisite: Graduate classification.

BAEN 631 Bioprocesses and Separations in Biotechnology
Credits 3. 3 Lecture Hours.
Application of engineering principles to recovery and purification of biological compounds derived from cell grown in bioreactors, transgenic animals, and plants. Process development, design, and scale up of downstream processes used in biotechnology and pharmaceutical industry. Emphasis on extraction, sedimentation, membrane filtration, precipitation, and liquid chromatography.
Prerequisites: Senior classification in engineering, G7, G8 or approval of instructor.

BAEN 651/ESSM 651 Geographic Information Systems for Resource Management
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Geographic Information System (GIS) approach to the integration of spatial and attribute data to study the capture, analysis, manipulation and portrayal of natural resource data; examination of data types/forms, as well as the integration of GIS with remote sensing and Global Positioning System; laboratory includes extensive use of GIS applications to conduct analyses of topics in natural resources.
Prerequisites: Graduate classification.
Cross Listing: ESSM 651/BAEN 651.

BAEN 652 Advanced Topics in Geographic Information Systems
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Advanced GIS topics with a focus on modeling actual GIS applications including relational and database theory, design and implementation and its connection to GIS; surface analysis with digital terrain models; and an introduction to spatial statistics.
Prerequisite: BAEN 651/ESSM 651.

BAEN 653 Bioreactor Design
Credits 3. 3 Lecture Hours.
Kinetics of enzyme reactions and cell growth applied to bioreactor design, media formulation, cell culture conditions, oxygen transfer and sterilization.
Prerequisite: CHEN 651 or approval of instructor.

BAEN 661 Experimental Methods in Biological and Agricultural Engineering
Credits 3. 3 Lecture Hours.
Planning and carrying out empirical research with appropriate application of statistical methods for experimental design and analysis; experimental design, data analysis, hypothesis testing, and experimental errors.
Prerequisites: STAT 601 or STAT 651 and STAT 652 or equivalent with approval of instructor.

BAEN 662 Statistical Methods in Biological and Agricultural Engineering
Credits 3. 3 Lecture Hours.
Statistical methods applied to problems in biological and agricultural engineering; parameter estimation; probability distribution fitting; time-series analysis; random variable generation; uncertainty analysis.
Prerequisite: Graduate classification.

BAEN 665 Design of Biological Waste Treatment Systems
Credits 3. 3 Lecture Hours.
Management and treatment of high organic content waste streams, with emphasis on agricultural, municipal, and agro-Industry wastewater; engineering design of biological waste treatment processes: resource recovery from waste streams: recycle and reuse of finished effluents.
Prerequisite: Graduate classification.
BAEN 667 Entropy Theory and Its Application in Water and Environmental Engineering  
**Credits 3.3 Lecture Hours.**  
Entropy theory, probability distributions, parameter estimation, hydrologic design, rainfall-runoff, infiltration and soil moisture, frequency analyses, sediment yield, velocity distributions, flow forecasting, hydraulic geometry, geomorphic structure, water distribution reliability and water availability assessment.  
**Prerequisites:** Graduate classification; knowledge of calculus and statistics at the undergraduate level and approval of instructor.

BAEN 669 Water Quality Engineering  
**Credits 3.3 Lecture Hours.**  
Nonpoint source pollution processes including transport mechanisms and contaminant fate; design of best management practices for abating nonpoint source pollution.  
**Prerequisites:** AGEN 350 or equivalent; SCSC 301; ENGR 214; graduate classification.

BAEN 670 Air Pollution Engineering  
**Credits 3.3 Lecture Hours.**  
Current topics in air pollution engineering including design and operation of air pollution abatement systems (cyclone, bag filters and scrubbers), emission factors, dispersion modeling, permitting, odor sensing and control, EPA/State Air Pollution Regulatory Agency (SAPRA), TSP, PM10, and PM2.5.  
**Prerequisites:** AGEN 477 or MEEN 477; MEEN 328 and MEEN 344; or approval of instructor.

BAEN 672 Small Watershed Hydrology  
**Credits 3.3 Lecture Hours.**  
Hydrology of small agricultural watersheds; precipitation frequency analysis; infiltration; runoff; erosion theory; sediment transport theory; evapotranspiration, and use of hydrological models.  
**Prerequisites:** AGEN 350, SCSC 301 and MATH 308 or their equivalent; graduate classification.

BAEN 673 Modeling Small Watersheds  
**Credits 3.3 Lecture Hours.**  
Transport of water and chemicals in small agricultural watersheds; simulation using hydrologic models coupled with geographical information systems (GIS); impact of land use on the quality of surface water and groundwater evaluated.  
**Prerequisites:** Basic hydrology course, BAEN 651/ESSM 651 or equivalent GIS course, and graduate classification.

BAEN 674 Vadose Zone Hydrology  
**Credits 3.3 Lecture Hours.**  
Fundamental concepts and advanced mathematical and experimental techniques for quantifying water, chemical, microorganism, and heat transport in the vadose zone (between soil surfaces and groundwater); provides a common platform for addressing issues related to soil and water resources, hydrology, geochemistry, microbiology, ecology, hydrogeology, and environmental engineering.  
**Prerequisite:** Graduate classification.

BAEN 675 Hydrology Across Scale  
**Credits 3.3 Lecture Hours.**  
Advanced concepts of surface and subsurface hydrologic processes, measurements, and modeling techniques across different spatio-temporal scales; contemporary issues related to the soil and water resources, hydrogeology, geochemistry, microbiology, ecology, hydrology, and environmental engineering.  
**Prerequisite:** Graduate classification in any engineering, agricultural science or geoscience program with environmental focus.

BAEN 661 Seminar  
**Credit 1.1 Other Hour.**  
Reviews, reports and discussion of ideas, recent advances and current topics.

BAEN 683 Peer-Review Process and Publication  
**Credit 1.1 Lecture Hour.**  
Techniques for communicating results of research that are defendable in a peer review process; student and advisor will select a research topic, identifying an appropriate target refereed journal; no thesis/dissertation preparation as a writing project accepted; critique other papers; prepare paper for review by instructor.  
**Prerequisite:** Graduate classification in Biological and Agricultural Engineering only.

BAEN 684 Professional Internship  
**Credits 1 to 6.1 to 6 Other Hours.**  
An on-the-job supervised experience program, conducted on an individual basis in the area of the student’s specialization in mechanized agriculture.  
**Prerequisite:** Graduate classification or approval of instructor.

BAEN 685 Directed Studies  
**Credits 1 to 4.1 to 4 Other Hours.**  
Advanced laboratory or field problems not related to student’s thesis.  
**Prerequisite:** Graduate classification.

BAEN 689 Special Topics in...  
**Credits 1 to 4.1 to 4 Lecture Hours. 0 to 4 Lab Hours.**  
Selected topics in an identified area of agricultural engineering. May be repeated for credit.

BAEN 690 Theory of Research  
**Credit 1.1 Lecture Hour.**  
Development of research inquiry and discussion of applicable experimental design, theoretical techniques and methodological principles of conducting original research; evaluation of current research of faculty and students in engineering and scientific literature. Communication of research proposals and results. May be repeated for credit.  
**Prerequisites:** Graduate classification and approval of department head.

BAEN 691 Research  
**Credits 1 to 23.1 to 23 Other Hours.**  
Research for thesis or dissertation.

**BEFB-Bilingual Ed Field Based Courses**

BEFB 425 Student Teaching in Hispanic Bilingual Education  
**Credits 3.3 Lecture Hours.**  
Observation and participation in Hispanic bilingual education classroom activity; supervised student teaching in accredited school. Must be taken on a satisfactory/unsatisfactory basis.  
**Prerequisites:** 2.5 GPA in teaching fields and professional development; approval of department head; senior classification. Must be taken concurrently with BEFB 426.

BEFB 426 Effective Instruction of Hispanic Students of Diverse Abilities  
**Credits 3.3 Lecture Hours.**  
Field-based application of effective instructional strategies for teaching Hispanic bilingual students of diverse abilities. Must be taken on a satisfactory/unsatisfactory basis.  
**Prerequisites:** 2.5 GPA in teaching fields and professional development; approval of department head. Must be taken concurrently with BEFB 425.
BEFB 470 Bilingual Assessment and Monitoring
Credits 3.3 Lecture Hours.
Assessment of language ability for second language learners; assessment instruments in bilingual/ESL programs; scoring and evaluation of second language assessment instruments.
Prerequisites: Junior or senior classification; BEFB 472 and BEFB 474. Must be taken concurrently with BEFB 476.

BEFB 472 Bilingual and Dual Language Methodologies
Credits 3.3 Lecture Hours.
Use of theory and effective teaching practice in promoting student's development of strong social and academic skills; relationship of culture to language.
Prerequisite: Junior or senior classification. Must be taken concurrently with BEFB 474.

BEFB 474 Biliteracy for Bilingual and Dual Language Classrooms
Credits 3.3 Lecture Hours.
Social and linguistic characteristics of second language learners influencing literacy skills; reading and literature instruction for second language learners; reading and writing process across the curriculum for second language learners.
Prerequisite: Junior or senior classification. Must be taken concurrently with BEFB 474.

BEFB 476 Content Area Instruction for Bilingual Programs
Credits 3.3 Lecture Hours.
Use of theory and various approaches for integrating English as a second language; learning strategies relating to how plans, procedures and units engage language teachers, students and learning environments.
Prerequisite: Junior or senior classification. Must be taken concurrently with BEFB 474.

BEFB 482 Seminar in Teachers as Effective Communicators
Credit 1.1 Lecture Hour.
Effective communication techniques for working with learners, colleagues, administrators and stakeholders; professional and social linguistic protocols for bilingual education teachers.
Prerequisites: Junior or senior classification; concurrent enrollment in BEFB 472 and BEFB 474.

BESC - Bioenvironmental Sci

Courses

BESC 201 Introduction to Bioenvironmental Sciences
Credits 3.3 Lecture Hours.
An introduction to the biological components of environmental sciences, with emphasis on the impact of the world's population on global resources; lectures by research scientists reflecting their disciplinary perspective in relevant areas.

BESC 204 Molds and Mushrooms: The Impact of Fungi on Society and the Environment
Credits 3.3 Lecture Hours.
Introduction to the fungi and the impact these organisms have on society and the environment; topics discussed will include: life cycles of fungi; classification schemes, pathogens of plants, animals and humans, fungi in food production; toxic fungi and the law, and others.

BESC 285 Directed Studies
Credits 1 to 4.1 to 4 Other Hours.
Individually supervised research or advanced studies for lower-division undergraduate students to independently investigate special problems not available in existing courses.
Prerequisite: Approval of instructor in consultation with departmental advisor.

BESC 291 Research
Credits 1 to 4.1 to 4 Other Hours.
Research conducted under the direction of faculty member in bioenvironmental sciences. May be repeated 3 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

BESC 314 Pathogens, the Environment and Society
Credits 3.3 Lecture Hours.
The impact of microorganisms (bacteria, fungi and viruses) on the development of modern culture and society; the role pathogens played in the history of mankind and the influence of the changing environment on emerging diseases.
Prerequisite: Junior or senior classification.

BESC 320 Water and the Bioenvironmental Sciences
Credits 3.3 Lecture Hours.
Critical understanding of salient issues relating to fresh water as a limited and important bioenvironmental resource.
Prerequisite: Junior or senior classification.

BESC 325 U.S. Environmental Regulations
Credits 3.3 Lecture Hours.
Investigation of the legal infrastructure of the U.S. associated with regulating environmental impacts; examination of major U.S. environmental statutes associated with air and water quality, toxic substances, waste and hazardous substance release, energy and natural resources; review the relationship between U.S. policy and international environmental regulations. May be taken 2 times for credit.
Prerequisites: BESC 201 and junior or senior classification.

BESC 367 U.S. Environmental Regulations
Credits 3.3 Lecture Hours.
Investigation of the legal infrastructure of the U.S. associated with regulating environmental impacts; examination of major U.S. environmental statutes associated with air and water quality, toxic substances, waste and hazardous substance release, energy and natural resources; review the relationship between U.S. policy and international environmental regulations. May be taken 2 times for credit.
Prerequisites: BESC 201 and junior or senior classification.

BESC 367 U.S. Environmental Regulations
Credits 3.3 Lecture Hours.
Investigation of the legal infrastructure of the U.S. associated with regulating environmental impacts; examination of major U.S. environmental statutes associated with air and water quality, toxic substances, waste and hazardous substance release, energy and natural resources; review the relationship between U.S. policy and international environmental regulations. May be taken 2 times for credit.
Prerequisites: BESC 201 and junior or senior classification.

BESC 401 Bioenvironmental Microbiology
Credits 3.3 Lecture Hours.
The interactions of microorganisms in diverse environments; applied aspects of microbial interactions in the environment, their effects on the environment, and potential use to solve environmental problems.
Prerequisites: SCSC 405 and 3 hours of organic chemistry, or equivalents; or approval of instructor.

BESC 402 Microbial Processes in Bioremediation
Credits 3.3 Lecture Hours.
(3-0) Metabolic pathways of microbes involved in the biodegradation of hazardous materials will be presented; ecological requirements for biotreatability of contaminated sites will be discussed emphasizing factors affecting microbial growth; strategies for in situ bioaugmentation will be presented.
Prerequisite: One semester of organic chemistry.
BESC 403 Sampling and Environmental Monitoring
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Introduction to environmental sampling and methodology; strategies and analyses of sampling data; overview of current applications of sampling and monitoring in the environmental sciences; emphasis on practical aspects of sampling from air, soil and water; detection and quantification of microbial and chemical unknowns in environmental media.
Prerequisite: Junior or senior classification or approval of instructor.

BESC 411 Environmental Health and Safety Compliance. (3-1). Credit 3
Credits 3. 3 Lecture Hours. 1 Lab Hour.
Investigation of various Environmental Health and Safety (EHS) practices necessary for compliance with state and federal regulations; reinforcement of real-world understanding; tour several regulated facilities on campus and learn about the particular TAMU-EHS compliance management strategies for each (utilities, underground storage tanks, wastewater treatment and hazardous waste facility).
Prerequisite: BESC 367 or similar regulation intensive course and approval of instructor.

BESC 481 Seminar
Credit 1. 1 Lecture Hour.
Capstone course for topics in bioenvironmental sciences; critical analysis of environmental issues through written themes and presentations. May be taken three times for credit.
Prerequisites: BESC 201 and senior classification in BESC major.

BESC 484 Field Experience
Credits 1 to 4. 1 to 4 Other Hours.
An on-the-job supervised experience program conducted in the area of the student's specialization.
Prerequisite: Junior or senior classification or approval of department head.

BESC 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Special problems for advanced undergraduates to permit study of subject matter not available in existing courses.
Prerequisite: BESC 201 or approval of instructor.

BICH 281 Seminar in Biochemical Research
Credit 1. 1 Lecture Hour.
Round table discussions with visiting seminar speakers; review current literature; topics including cutting edge research in biochemistry.
Prerequisites: BICH 107 and freshman or sophomore classification in biochemistry or approval of instructor.

BICH 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Introduction to laboratory research.
Prerequisite: Freshman or sophomore classification in biochemistry or approval of instructor.

BICH 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of biochemistry. May be repeated for credit.
Prerequisite: Freshman or sophomore classification in biochemistry or approval of instructor.

BICH 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in Biochemistry. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor; biochemistry majors only.

BICH 303 Elements of Biological Chemistry
Credits 3. 3 Lecture Hours.
Survey of the biochemical sciences designed for the non-biochemistry major; introduction to the chemistry and metabolism of biologically important molecules, the biochemical basis of life processes, cellular metabolism and regulation. Students requiring biochemistry in greater depth should register for BICH 410 and BICH 411. Not open to biochemistry majors.
Prerequisite: CHEM 222 or equivalent.

BICH 404 Biochemical Calculations
Credits 2. 2 Lecture Hours.
Quantitative and computational approaches to biochemical problems.
Prerequisites: BICH 440 or registration therein; junior or senior classification.

BICH 407 Horizons in Biological Chemistry II
Credit 1. 1 Lecture Hour.
Application of formal classroom instruction; applied view of biochemical concepts; use of biochemical principles to ascertain, evaluate, and make judgments on research information. May be taken five times.
Prerequisite: BICH 411 or BICH 441.

BICH 410 Comprehensive Biochemistry I
Credits 3. 3 Lecture Hours. 1 Lab Hour.
Structure, function and chemistry of proteins and carbohydrates; kinetics, mechanisms and regulation of enzymes; metabolism of carbohydrates. Not open to biochemistry or genetics majors.
Prerequisite: CHEM 228 or approval of instructor.

BICH 411 Comprehensive Biochemistry II
Credits 3. 3 Lecture Hours. 1 Lab Hour.
A continuation of BICH 410. Structure, function, chemistry and metabolism of lipids and nucleic acids; cellular metabolism viewed from the standpoint of energetics and control mechanisms; interrelationships of metabolic pathways. Not open to biochemistry or genetics majors.
Prerequisite: BICH 410.
BICH 412 Biochemistry Laboratory I  
Credit 1. 3 Lab Hours.  
Selected methods used to identify, isolate, purify and characterize biomolecules. Not open to biochemistry or genetics majors.  
Prerequisite: BICH 410 or registration therein.

BICH 414 Biochemical Techniques I  
Credits 2. 6 Lab Hours.  
Techniques currently used in biochemistry such as spectrophotometry, column chromatography (gel filtration, ion exchange) electrophoresis and immunoelectrophoresis, performed in purification of proteins, enzymes and nucleic acids. For majors in biochemistry, genetics, molecular and cell biology and microbiology.  
Prerequisites: BICH 440; CHEM 316 and CHEM 318 or registration therein.

BICH 419/GENE 419 Computational Techniques for Evolutionary Analysis  
Credits 3.3 Lecture Hours.  
Computational techniques for studying evolution; algorithms for construction and analysis of evolutionary relationships.  
Prerequisite: Junior or senior classification or approval of instructor.  
Cross Listing: GENE 419/BICH 419.

BICH 431/GENE 431 Molecular Genetics  
Credits 3. 3 Lecture Hours.  
Molecular basis for inheritance: gene structure and function, chromosomal organization, replication and repair of DNA, transcription and translation, the genetic code, regulation of gene expression, genetic differentiation and genetic manipulations.  
Prerequisites: BICH 410 or BICH 440; GENE 301 or GENE 302 or GENE 320/BIMS 320.  
Cross Listing: GENE 431/BICH 431.

BICH 432/GENE 432 Laboratory in Molecular Genetics  
Credits 2. 6 Lab Hours.  
Laboratory for molecular genetics providing technical experience with tools of molecular biology.  
Prerequisite: GENE 301, GENE 302 or GENE 320/BIMS 320; BICH 410 or BICH 440.  
Cross Listing: GENE 432/BICH 432.

BICH 440 Biochemistry I  
Credits 3. 3 Lecture Hours.  
Rigorous treatment of the structure, function and chemistry of proteins and carbohydrates; kinetics, mechanisms and regulation of enzymes; metabolism of carbohydrates. Course designed for biochemistry and genetics majors and honors students only.  
Prerequisite: CHEM 228 or approval of instructor.

BICH 441 Biochemistry II  
Credits 3. 3 Lecture Hours.  
Continuation of BICH 440; structure, function, chemistry and metabolism of lipids and nucleic acids, cellular metabolism viewed from the standpoint of energetics and control mechanisms; interrelationships of metabolic pathways. Course designed for biochemistry and genetics majors and honors students only.  
Prerequisite: BICH 440.
BICH 602 Fundamentals of Biochemistry II
Credits 3.3 Lecture Hours.
Major metabolic pathways for carbohydrates, lipids, amino acids, proteins
and nucleic acids, emphasizing oxidative processes and the biosynthesis
of RNA, DNA and protein; regulation of cellular metabolism.
Prerequisite: BICH 601.

BICH 603 General Biochemistry I
Credits 3.3 Lecture Hours.
The biochemical properties of macromolecules found in living matter;
proteins, enzymes and nucleic acids.
Prerequisites: BICH 410 or BICH 601; CHEM 228 and CHEM 323.

BICH 605 Methods of Biochemical Analysis
Credits 3.3 Lecture Hours.
Experimental techniques important in biochemistry including
methodologies for data analysis.
Prerequisite: Graduate classification in biochemistry or approval of
instructor.

BICH 608 Critical Analysis of the Biochemical Literature
Credits 2.2 Lecture Hours.
Reading and presentation of original articles in biochemistry and related
fields to enhance understanding of experimental logic and scientific
communication.
Prerequisite: Graduate classification in biochemistry or approval of
instructor.

BICH 609 Preparation of a Biochemical Research Proposal
Credits 2.2 Lecture Hours.
Development and presentation of hypotheses, specific aims, significance and
experimental approaches for a biochemical research proposal.
Prerequisite: Graduate classification in biochemistry.

BICH 624 Enzymes, Proteins and Nucleic Acids
Credits 3.3 Lecture Hours.
Chemical and physical properties of enzymes, proteins and nucleic acids;
thermodynamics, kinetics and mechanisms of enzyme-catalyzed reactions
and protein-nucleic acid interactions.
Prerequisites: BICH 603; CHEM 324.

BICH 625/MCMD 625 Nucleic Acid--Protein Interactions
Credit 1.1 Lecture Hour.
Mechanisms of nucleic acid-protein interactions involved in fundamental
biochemical processes such as DNA replication and rearrangement,
transposition, transcription, RNA splicing and translation; original research
articles presented focusing on experimental approaches, interpretation of
results and overall significance. Course may be taken 8 times for credit.
Prerequisites: BICH 431/GENE 431 or GENE 431/BICH 431 or
equivalent; approval of instructor.
Cross Listing: MCMD 625/BICH 625.

BICH 628/CSCE 628 Computational Biology
Credits 3.3 Lecture Hours.
Introduction to computational biology; formulations of biology problems as
computational problems; computational approaches to solve problems in
genomics and proteomics.
Prerequisite: Graduate classification or approval of instructor.
Cross Listing: CSCE 628/BICH 628.

BICH 631/GENE 631 Biochemical Genetics
Credits 3.3 Lecture Hours.
Genetic control of cellular metabolism; mechanism of gene action; gene-
enzyme relationships; regulation of gene expression; structure and
organization of genomes; biochemical manipulation and characterization
of genetic molecules.
Prerequisites: BICH 431/GENE 431 or GENE 431/BICH 431; BICH 603.
Cross Listing: GENE 631/BICH 631.

BICH 650/BIOL 650 Genomics
Credits 3.3 Lecture Hours.
Modern genomics as a tool for understanding biological systems,
genome structure, and organization as well as the history of sequencing
technologies; focus on transcriptional, translational and functional
omics.
Prerequisite: Graduate classification or approval of instructor.
Cross Listing: BIOL 650/BICH 650.

BICH 654 Structural Biochemistry
Credits 3.3 Lecture Hours.
Basic physics of X-ray diffraction, crystal structure methods, introduction to
structural data bases, molecular geometry and molecular modeling.
Prerequisite: Approval of instructor.

BICH 655 Crystallography Methods
Credits 3.2 Lecture Hours. 3 Lab Hours.
The practice of x-ray diffraction in the study of biomolecules; solving
protein crystal structures.
Prerequisite: Graduate classification.

BICH 661 Advanced Genome Annotation with Ontologies
Credit 1.2 Lab Hours.
Advanced topics in functional annotation using ontologies; usage issues and
quality control for ontologies and annotations; mentoring annotation
activities from BICH 460 and evaluation of annotations. May be taken
three times for credit.
Prerequisite: Graduate classification or approval of instructor.

BICH 662 Eukaryotic Transcription
Credit 1.1 Lecture Hour.
Intensive short course in molecular mechanisms of eukaryotic
transcription, and its regulation.
Prerequisite: BICH 631/GENE 631 or GENE 631/BICH 631 or approval of
instructor.

BICH 664 Fluorescence Spectroscopy
Credit 1.1 Lecture Hour.
Theory underly[b]ing fluorescence spectroscopy as well as practical
considerations that must be understood when utilizing fluorescence
as an analytical tool; the use of both steady-state and time-resolved
fluorescence measurements to evaluate fluorescence quantum yield,
quenching, anisotropy, and energy transfer.
Prerequisite: Graduate classification.

BICH 665 Biochemical Kinetics
Credit 1.1 Lecture Hour.
Theoretical principles and practical approaches to analysis of chemical
kinetics with specific examples of applications to biochemistry and
biochemical investigations.
Prerequisite: Graduate classification.
BICH 667 Molecular Probes
Credit 1. 1 Lecture Hour.
Function of biomolecules in the context of living cells (in cellulo as opposed to in vitro); chemical tools and analytical techniques; application in the investigation of cellular processes; identification of biological problems and design.
Prerequisite: Graduate classification.

BICH 671/MCMD 671 Macromolecular Folding and Design
Credit 1. 1 Lecture Hour.
Oral presentations and discussions in the general area of biomolecular structure, folding, function and design. May be taken 12 times.
Prerequisite: Approval of instructor.
Cross Listing: MCMD 671/BICH 671.

BICH 672/MCMD 672 Biological Membranes
Credit 1. 1 Lecture Hour.
Seminar-based course examining recent discoveries in the structure, function and assembly of biological membranes; oral presentation by students on current literature in molecular biology and biochemistry.
Prerequisite: Approval of instructor.
Cross Listing: MCMD 672/BICH 672.

BICH 673/GENE 673 Gene Expression
Credit 1. 1 Lecture Hour.
Oral presentations and discussions related to the biochemistry and molecular biology of gene expression in animal, plant and microbial systems. May be repeated for credit up to 12 times.
Prerequisite: Graduate classification in biochemistry or genetics or approval of instructor.
Cross Listing: GENE 673/BICH 673.

BICH 674/MCMD 674 Protein Folding and Stability
Credit 1. 1 Lecture Hour.
Selected topics from recent literature in the general areas of protein folding, structure, and stability.
Prerequisite: Approval of instructor.
Cross Listing: MCMD 674/BICH 674.

BICH 675 Plant Biochemistry and Genomics
Credit 1. 1 Lecture Hour.
Overview of current literature dealing with plant biochemistry/genomics; biochemistry topics will include the function of protein-protein interactions related to plant specific processes such as plant-pathogen interactions; genomics topics will focus on current analysis of plant genomes and how the derived information is being utilized to elucidate biochemical pathways.
Prerequisite: Graduate classification.

BICH 676 Bacteriophage Biology
Credit 1. 1 Lecture Hour.
Oral presentation and discussion in the general area of the viruses of microbes and bacteria; literature review with a broad scope, from basic molecular biology of phages to practical applications of microbial virus technology. May be taken 12 times for credit.
Prerequisite: Approval of instructor.

BICH 677 Chemical Genetics and Drug Discovery
Credit 1. 1 Lecture Hour.
Review, discuss and present scientific literature studies based on the usage of small molecules to alter protein function. May be repeated for credit.
Prerequisite: Graduate classification.

Courses

BIMS 101 Introduction to Biomedical Science
Credit 1. 1 Lecture Hour.
Areas and opportunities in the varied fields of applied biology, professional programs, and the allied health industry. Open to all majors interested in the life sciences as related to health and disease.

BIMS 110 One Health in Action
Credit 1. 1 Lecture Hour.
Exploration of the concept of One Health; the interconnected and interdependent health of humans, animals and ecosystems; the conceptual framework that encompasses human and veterinary medical sciences, agricultural sciences, food safety, public health, epidemiology, environmental health, toxicology, wildlife ecology and conservation and many related fields of study or research.
Prerequisite: Freshman or sophomore classification or approval of instructor.

BIMS 201 Introduction to Phenotypic Expression in the Context of Human Medicine
Credit 2. 2 Lecture Hours.
Study of human genetics with respect to gene expression as it pertains to the cell cycle, development, cancer, aging and epigenetics; discussions and debates surrounding medical examples and case studies.
Prerequisite: BIOL 112, CHEM 227; or approval of instructor.
BIMS 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of biomedical science. May be repeated for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

BIMS 291 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in biomedical sciences. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

BIMS 301 Biomedical Sciences Study Abroad
Credits 2 to 12. 2 to 12 Lecture Hours.
For students in approved programs abroad. May be repeated for credit. Maximum 3 hours free elective credit in the BIMS degree plan. Must be taken on a satisfactory/unsatisfactory basis.

BIMS 320/GENE 320 Biomedical Genetics
Credits 3. 3 Lecture Hours.
Fundamental genetic principles as applied to biomedical science; Mendelian inheritance, linkage and genetic mapping, mutagenesis and pedigree analysis; molecular basis of gene function and inherited disease; gene therapy and genetic counseling.
Prerequisites: Junior or senior classification; BIMS major with a minimum overall 2.5 TAMU GPA.
Cross Listing: GENE 320/BIMS 320.

BIMS 392 Cooperative Education in Biomedical Science
Credits 2. 20 Other Hours.
Educational work assignment by a student in the field of his or her career interest and course of study. Supervision of the student will be by the cooperating employer and the instructor. A technical report, approved by the instructor, on a related subject area will be assigned. May be repeated for credit.
Prerequisites: Approval of the college coordinator of cooperative education; BIMS major with a minimum overall 2.5 TAMU GPA.

BIMS 405/GENE 405 Mammalian Genetics
Credits 3. 3 Lecture Hours.
Comparative mammalian genetic systems with emphasis on laboratory animals; organization and expression of mammalian genes; development and use of genetically defined animals in biomedical and genetic research.
Prerequisites: GENE 301, BIMS 320/GENE 320 or GENE 320/BIMS 320; junior or senior classification.
Cross Listing: GENE 405/BIMS 405.

BIMS 421/GENE 421 Advanced Human Genetics
Credits 3. 3 Lecture Hours.
A rigorous, analytical approach to genetic analysis of humans including diagnosis and management of genetic disease in humans; transmission of genes in human populations; human cytogenetics; the structure of human genes; human gene mapping; molecular analysis of genetic disease; genetics screening and counseling.
Prerequisites: BIMS 320/GENE 320 or GENE 320/BIMS 320; BICH 410 or 440; junior or senior classification.
Cross Listing: GENE 421/BIMS 421.

BIMS 452/GENE 452 Modifying Mammalian Genomes for Biomedical Research
Credits 3. 3 Lecture Hours.
Review advances in the production of transgenic animals, the manipulation of embryonic stem cells for transgenics and therapeutics, the modification of specific genes in mammalian species by homologous recombination and RNA interference; special emphasis on genetic manipulation of cells and animals for biomedical research, stem-cell and gene therapy.
Prerequisite: BIMS 320/GENE 320, GENE 301 or 320.
Cross Listing: GENE 452/BIMS 452.

BIMS 481 Seminar in Biomedical Science
Credit 1. 1 Other Hour.
Recent advances in biomedical sciences. To be taken on a satisfactory/unsatisfactory basis.
Prerequisites: Junior or senior classification in life sciences majors; BIMS major with a minimum overall 2.5 TAMU GPA.

BIMS 484 Biomedical Science Field Experience
Credits 2. 2 Other Hours.
On-the-job training in the Biomedical Science industry; development of objectives and goals; evaluation by supervisor required.
Prerequisite: Approval of department head; BIMS major with a minimum overall 2.5 TAMU GPA.

BIMS 485 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Directed individual study of problems in the biomedical sciences with emphasis in the allied health professions, hospital administration, and the health-related industry approved by the instructor.
Prerequisites: Junior or senior classification; approval of instructor; BIMS major with a minimum overall 2.5 TAMU GPA.

BIMS 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of biomedical science. May be repeated for credit.
Prerequisite: Junior or senior classification; BIMS major with a minimum overall 2.5 TAMU GPA.

BIMS 491 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in biomedical sciences. May be repeated 2 times for credit.
Prerequisites: 3.0 TAMU GPA; BIMS 485; junior or senior classification and approval of instructor.

BIMS 5126 Responsible Conduct in Biomedical Research
Credit 1. 1 Lecture Hour.
A survey of topics required for research; utilizes outside reading assignments, online modules, class presentation and discussion of cases associated with topic; offered spring semester of odd years.

BIMS 5127 Microscopy
Credits 2. 2 Lecture Hours.
Principles and methods of scanning electron microscopy. Technical instruction includes tissue preparation and equipment maintenance. Includes the usage of scanning electron, light, fluorescent and confocal microscopes and computer imaging techniques. Offered spring semester.
BIMS 5128 Nanobiomaterials and Regenerative Medicine
Credit 1. 1 Lecture Hour.
This course will bring state-of-the-art knowledge of nanobiomaterials and regenerative medicine to students. Topics include nanobiomaterials design, syntheses and preparation, nanobiotechnology for scaffold fabrication, surface functionality of nanobiomaterials, nanobiomaterials for drug and gene delivery, stem cell and nanobiomaterials, and the applications of nanobiomaterials for various tissue regeneration (bone, cartilage, tooth, etc.).

BIMS 5190 Seminar: Current Issues in Science
Credit 1. 1 Other Hour.
Guest lectures, workshop lectures and discussion includes topics of current interest to program faculty and students and of general interest in the biomedical sciences. Offered fall and spring semesters.

BIMS 5205 Oral Histology
Credits 3. 3 Lecture Hours.
Origin and development of the dental tissues and their related structures. Current publications and research reports are used to provide students with an opportunity to investigate some phase of active interest to them and their anticipated future interest in practice. Offered fall and spring semesters.

BIMS 5208 Microbiology
Credits 3. 3 Lecture Hours.
Introduction to basic microbiology with emphasis on oral and medical microbes, taxonomy and microbial physiology. Taught in conjunction with dental curriculum. Additional readings and discussion for graduate student. Offered fall and spring semesters.

BIMS 5214 Clinical Pharmacology
Credit 1. 1 Other Hour.
(0-1.5). Selection and evaluation of dentally-related drugs and review of current literature; seminar format. Limited to clinical specialty students. Offered fall semester.

BIMS 5221 Research Design and Methodology
Credits 2. 2 Lecture Hours.
An introduction to the research process; sufficient background in research design and methodology is provided to enable students to critically evaluate literature and assist in the formulation of research projects. Also includes discussion of rules and regulations for human and animal research. Offered fall semester.

BIMS 5222 Applied Biostatistics
Credits 2. 2 Lecture Hours.
Overview of applied biostatistics with an emphasis on oral health research. Training includes computer-based instruction in data analysis using SPSS. Offered spring semester.

BIMS 5224 Teaching Practicum in Applied Biostatistics
Credits 1 to 4. 1 to 4 Lecture Hours. 1 to 4 Lab Hours.
This practicum is designed to engage the advanced student in all aspects of teaching applied biostatistics. Objective (1) of the practicum is to learn how to present biostatistics such that health professions graduate students can master it. Such mastery includes applying statistical concepts and methods to one's own research and to that published in the professional literature. Objective (2) is to learn about the creation and evaluation of fair assessments of student performance (tests, projects, etc. and grading them). Not available for distance learning.

BIMS 5244 Advanced Biology of Mineralized Tissues
Credits 2. 2 Lecture Hours.
Overview of the advanced biology of mineralized tissues and their roles in oral health and disease. The course will cover the basic molecular biology of teeth and the skeleton, including bone and cartilage and other aspects of systemic biology. Offered fall semester.

BIMS 5251 Immunology
Credits 1 to 2. 1 to 2 Lecture Hours.
Update on the principles of immunology with an emphasis on oral aspects and related diseases. Offered fall semester.

BIMS 5263 Sensory Neurobiology and Pain
Credit 1. 1 Lecture Hour.
An overview of the various sensory systems is explored with the primary emphasis on the processing of pain and temperature information from the craniofacial complex. Offered summer semester of odd years.

BIMS 5280 Introduction to Evidence-Based Dentistry and Clinical Research
Credits 3. 3 Lecture Hours.
This is a year-long course for graduate students consisting of lecture sessions, and small group discussions and seminars. A progress grade will be given at the end of the first semester followed by a final grade of record at the end of the year. The main goal of the EBD curriculum at Texas A&M Baylor College of Dentistry is to provide dental scientists and dentists-in-training with the knowledge and tools to take advantage of constantly increasing knowledge in clinical, material, and basic biomedical sciences. Taught in conjunction with dental curriculum. Additional readings and discussion for graduate students. Not available for distance learning.

BIMS 5301 Neuroscience
Credits 2. 1 Lecture Hour. 1 Lab Hour.
Lectures and laboratory sessions on gross and microscopic anatomy of the human central and peripheral nervous system. Neurophysiology of the central nervous system, peripheral nerves, special sense, autonemics and clinical mediation. Offered spring semester.

BIMS 5307 Cellular and Molecular Biology
Credits 2 to 3. 2 to 3 Lecture Hours.
Prerequisite: none. Intermediary metabolism of protein, protein synthesis, nucleic acid metabolism and biochemical endocrinology. Offered fall semester.

BIMS 5312 Applied Medical Physiology
Credits 2. 1 Lecture Hour. 1 Lab Hour.
Basic physiology of the cardiovascular, respiratory and renal systems. Each area is expanded to include physiology problems seen clinically as they relate to the dental intern. Offered summer semester.

BIMS 5322 Advanced Biostatistics
Credits 2. 2 Lecture Hours.
Advanced biostatistical methods, including multivariate and longitudinal analysis; computer simulations; applications in craniofacial biology.

BIMS 5341 Techniques in Cell and Molecular Biology
Credit 1. 1 Lecture Hour.
Principal methods of cellular/molecular investigation of proteins and nucleic acids including immunochemistry, autoradiography, immunohistochemistry, polymerase chain reaction, intracellular recording and fluorescence confocal microscopy. Offered spring semester.

Prerequisite: BIMS 5128 or equivalent.
BIMS 5350 Oral Microbiology
Credits 2 to 3. 2 to 3 Lecture Hours.
The environment of the mouth is described and its relation to the endogenous and exogenous oral microbiota; relationship between disease and bacterial species; discussion of species differences; molecular mechanisms of bacterial pathogenesis; and host response to oral microbes. Offered spring semester.
Prerequisites: BIMS 5208 or equivalent.

BIMS 5360 Advanced Neuroscience
Credit 1. 1 Lecture Hour.
Advanced concepts of neuroscience are presented with an in-depth coverage of membrane and system function.
Prerequisite: BIMS 5301 or equivalent.

BIMS 5376 Evolutionary and Functional Morphology
Credit 1. 1 Lecture Hour.
Comparative anatomy and evolution of craniofacial structure, with emphasis on current techniques of electrophysiology, kinesiology, and musculoskeletal biomechanics of orofacial function. Offered fall semester.

BIMS 5402 General Histology
Credits 3. 3 Lab Hours.
General histology and microscopic anatomy of the four basic tissues. Laboratory study of electron micrographs and prepared slides is employed. Offered fall semester.

BIMS 5603 Gross Anatomy
Credits 4. 4 Lab Hours.
Conceptual and functional basis for understanding macroscopic structure of the human body utilizing laboratory dissection of human cadavers. Regional anatomy of the back, thorax, upper limb and head is emphasized. Offered fall semester.

BIMS 5611 Mammalian Physiology
Credits 4 to 5. 4 to 5 Lab Hours.
Basic physiology principles of cells, muscle, nerve, blood, heart, circulation, respiration, digestion, excretion and central nervous system in maintaining homeostasis. Classical laboratory experiments are used to demonstrate these principles. Offered spring semester.

BIMS 5V04 Head and Neck Anatomy
Credits 1 to 1.5. 1 to 1.5 Lab Hours.
5. Special emphasis on surgical anatomy and distribution of nerves and vasculature of particular interest in the field of dentistry. Offered summer semester.

BIMS 5V40 Cellular and Molecular Biology or Oral Craniofacial Tissues
Credits 1 to 10. 1 to 10 Lecture Hours.
A general survey intended to provide background information concerning the methods and theory of modern cellular/molecular biology. This lays the groundwork for more advanced study, aids those interested in incorporating cellular/molecular approaches into their research work and enables one to read, understand and evaluate current scientific literature. Offered spring semester.
Prerequisites: BIMS 5307 or equivalent.

BIMS 5V42 Cellular and Molecular Biology or Oral Craniofacial Tissues II
Credits 1 to 10. 1 to 10 Lecture Hours.
Processes of epithelial-mesenchymal interaction as related to odontogenesis; amelogenesis; dentinogenesis; collagen formation, intracellular and extracellular calcium homeostasis; plaque and calculus; and wound healing. Offered spring semester.

BIMS 5V69 Growth and Mechanisms of Development
Credits 0 to 2. 0 to 2 Lecture Hours.
Normal prenatal growth and development. Patterns and mechanisms of growth and maturation. Offered fall semester.

BIMS 5V73 Advanced Craniofacial Development and Craniofacial Anomalies
Credits 1 to 10. 1 to 10 Lecture Hours.
Detailed investigation of the basic processes and mechanisms of postnatal growth and adaptation of the craniofacial region. This course emphasizes the areas of controversy surrounding current understanding of the factors influencing postnatal craniofacial growth and form; the adaptive capabilities of growth and form; the adaptive capabilities of craniofacial tissues; the effect of altered function on craniofacial growth and form; and the influence of treatment on craniofacial growth and form. Also considered are theories of craniofacial growth. Offered fall semester.

BIMS 5V75 Physical Growth and Maturation
Credits 0.50 to 2. 0.50 to 2 Lecture Hours.
5 to 2. Pattern and mechanisms of postnatal growth and maturation. Offered spring semester.

BIMS 5V78 Teaching Practicum in Gross Anatomy
Credits 3. 3 Lab Hours.
Assist with laboratory dissection of human cadavers. Lead class study groups and prepare pro-sections for the D1 class. Regional anatomy of the back, thorax, upper limb and head is emphasized. Taught in conjunction with dental curriculum. Additional readings and exercises are designed to instruct graduate students in how to teach the subject.

BIMS 5V81 Seminar: Current Issues in Bone and Mineralized Tissue Biology
Credit 1. 1 Other Hour.
Topics of current importance in bone and mineralized tissue biology. Offered fall and spring semesters.

BIMS 5V91 Special Topics in Biomedical Sciences
Credits 0 to 10. 0 to 10 Other Hours.
Reading and discussion of current literature pertinent to topic of seminar. Presentation of papers on selected topics is required for all students. May be used for multiple courses in any one semester. Offered fall, spring and summer semesters.

BIMS 5V92 Special Topics in Biomedical Sciences
Credits 0 to 10. 0 to 10 Other Hours.
Reading and discussion of current literature pertinent to topic of seminar. Presentation of papers on selected topics is required for all students. May be used for multiple courses in any one semester. Offered fall, spring and summer semesters.

BIMS 5V93 Directed Readings
Credits 0 to 10. 0 to 10 Other Hours.
Individualized courses for single students involve in-depth study of specific topics in the biomedical sciences.

BIMS 5V94 Directed Readings
Credits 0 to 10. 0 to 10 Other Hours.
Individualized courses for single students involve in-depth study of specific topics in the biomedical sciences.

BIMS 5V95 Directed Readings
Credits 0 to 10. 0 to 10 Other Hours.
Individualized courses for single students involve in-depth study of specific topics in the biomedical sciences.
BIMS 5V96 Research and Special Problems  
Credits 0 to 10. 0 to 10 Other Hours.  
Concentrated investigation in any area of biomedical sciences. This course may be used for individualized laboratory rotations or research.

BIMS 5V97 Research and Special Problems  
Credits 0 to 10. 0 to 10 Other Hours.  
Concentrated investigation in any area of biomedical sciences. This course may be used for individualized laboratory rotations or research.

BIMS 5V98 Thesis Research and Preparation of Master’s Thesis  
Credits 0 to 10. 0 to 10 Other Hours.  
Course used by students after achieving candidacy for research and preparation of Ph.D. dissertation.

**BIOL - Biology**

**Courses**

**BIOL 101 Botany**  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
(BIOL 1111 and 1111, BIOL 1111*) Botany. Structure, physiology and development of plants with an emphasis on seed plants. (Not open to students who have taken BIOL 111 and BIOL 112 or BIOL 113.); includes laboratory that reinforces and provides supplemental information related to the lecture topics.

**BIOL 107 Zoology**  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
(BIOL 1313 and 1113, 1413*) Zoology. Survey of animal life with respect to cell organization, genetics, evolution, diversity of invertebrates/vertebrates, anatomy/physiology, and interaction of animals with their environment; includes laboratory that reinforces and provides supplemental information related to lecture topics. (Not open to students who have taken BIOL 111 and BIOL 112 or BIOL 113).

**BIOL 111 Introductory Biology I**  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
(BIOL 1306 and 1106, 1406*) Introductory Biology I. First half of an introductory two-semester survey of contemporary biology that covers the chemical basis of life, structure and biology of the cell, molecular biology and genetics; includes laboratory that reinforces and provides supplemental information related to the lecture topics.

**BIOL 112 Introductory Biology II**  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
(BIOL 1307 and 1107, 1407*) Introductory Biology II. The second half of an introductory two-semester survey of contemporary biology that covers evolution, history of life, diversity and form and function of organisms; includes laboratory that reinforces and provides supplemental information related to the lecture topics.  
Prerequisite: BIOL 111.

**BIOL 113 Essentials in Biology**  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
One-semester in introductory biology for non-majors; chemical basis of life, cellular and molecular biology, genetics, evolution, biodiversity and interaction of organisms with their environment; includes a laboratory to supplement and reinforce lecture topics.

**BIOL 206 Introductory Microbiology**  
Credits 4. 3 Lecture Hours. 4 Lab Hours.  
(BIOL 2321 and 2121, 2421*) Introductory Microbiology. Basic microbiology of prokaryotes and eukaryotes; main topics include morphology, physiology, genetics, taxonomy, ecology, medically important species and immunology; mandatory laboratory designed to give hands-on experience and to reinforce basic principles.  
Prerequisites: BIOL 101, BIOL 107, BIOL 111, or BIOL 113; CHEM 101 and CHEM 111 or CHEM 103 and CHEM 113. May not be used for credit by biology, molecular and cell biology, microbiology, zoology, predentistry or premedicine majors.

**BIOL 213 Molecular Cell Biology**  
Credits 3. 3 Lecture Hours.  
Explores the molecular basis of cell structure, function and evolution; gene regulation, cell division cycle, cancer, immunity, differentiation, multicellularity and photosynthesis; may not take concurrently with, or after the completion of, BIOL 413.  
Prerequisites: BIOL 112; CHEM 227 or concurrent enrollment.

**BIOL 214 Genes, Ecology and Evolution**  
Credits 3. 3 Lecture Hours.  
A genetically-based introduction to the study of ecology and evolution; emphasis on the interactions of organisms with each other and with their environment.  
Prerequisite: BIOL 112.

**BIOL 285 Directed Studies**  
Credits 1 to 4. 1 to 4 Other Hours.  
Problems in various phases of plant, animal and microbial science.  
Prerequisites: Freshman or sophomore classification; approval of ranking professor in field chosen and Undergraduate Advising Office.

**BIOL 289 Special Topics in...**  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of biology. May be repeated for credit.  
Prerequisite: Approval of instructor.

**BIOL 291 Research**  
Credits 0 to 4. 0 to 4 Other Hours.  
Active research of basic nature under the supervision of a Department of Biology faculty member. May be repeated for credit.  
Prerequisites: Freshman or sophomore classification and approval of faculty member.

**BIOL 295 Research Fundamentals in the Life Sciences**  
Credit 1. 1 Lecture Hour.  
First course of four in capstone research program in biology; groundwork for subsequent research-intensive courses; practical understanding of how biological research is accomplished; develop models; synthesize work; glean predictive hypothesis; design critical tests; collect and analyze data; refine or reject hypotheses.  
Prerequisite: BIOL 213 or concurrent enrollment, or approval instructor.

**BIOL 300 Research Seminar: Tropical Ecology in Costa Rica**  
Credit 1. 1 Lecture Hour.  
Advanced instruction in research activities for Costa Rica; critical planning and writing skills essential in conducting research and communicating results using scientific methods and formatting.  
Prerequisites: Junior or senior classification; approval of instructor.
BIOL 318 Chordate Anatomy
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Classification, phylogeny, comparative anatomy, and biology of chordates; diversity, protochordates, vertebrate skeletons, shark and cat anatomy studied in laboratory.
Prerequisite: BIOL 112.

BIOL 319 Integrated Human Anatomy and Physiology I
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Integrated approach to cellular, neural, skeletal, muscular anatomy and physiology; includes some histology, histopathology, radiology and clinical correlations.
Prerequisite: BIOL 111 and BIOL 112, or BIOL 107.

BIOL 320 Integrated Human Anatomy and Physiology II
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Continuation of BIOL 319. Integrated approach to endocrine, cardiovascular, respiratory, digestive, urinary, reproductive and developmental anatomy and physiology; includes some histology, histopathology, radiology and clinical correlations.
Prerequisite: BIOL 111 and BIOL 112, or BIOL 107; BIOL 319 or approval of instructor.

BIOL 328 Plants and People
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Development and uses of principal economically important plants of the world; plants and plant parts used in production of important commodities; vascular plants.
Prerequisite: BIOL 101 or BIOL 111 or BIOL 112 or approval of instructor.

BIOL 335 Invertebrate Zoology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Morphology, taxonomy, natual history and phylogeny of invertebrate animals, with emphasis on biodiversity; class includes both lecture and lab. Labs include study of preserved material and demonstration of living animals in aquaria and terraria.
Prerequisite: BIOL 112 or approval of instructor.

BIOL 344 Embryology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Introduction to general and comparative embryology; molecular and cellular mechanisms of development; genetics and early development of selected invertebrates (C. elegans, Drosophila and sea urchin) and emphasis on vertebrates (frog, fish, chick and mouse).
Prerequisite: BIOL 213 or GENE 302.

BIOL 350 Computational Genomics
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Hands-on approach to obtaining, organizing and analyzing genome-related data; emphasis on asking and answering biologically relevant questions by designing and performing experiments using computers; understanding biology from a computational perspective.
Prerequisite: Junior or senior classification in life sciences, engineering, mathematics, chemistry.

BIOL 351 Fundamentals of Microbiology
Credits 4. 3 Lecture Hours. 4 Lab Hours.
Introduction to modern microbiology with emphasis on prokaryotes; includes microbial cell structure, function, and physiology; genetics, evolution, and taxonomy; bacteriophage and viruses; pathogenesis and immunity; and ecology and biotechnology; includes laboratory experience with microbial growth and identification.
Prerequisites: BIOL 112; CHEM 227, and CHEM 237 or CHEM 231; or approval of instructor.

BIOL 352 Diagnostic Bacteriology
Credits 4. 2 Lecture Hours. 6 Lab Hours.
Practical experience in handling, isolation and identification of pathogenic microorganisms using biochemical tests and rapid identification techniques.
Prerequisite: BIOL 206 or BIOL 351.

BIOL 357 Ecology
Credits 3. 3 Lecture Hours.
Analysis of ecosystems at organismal, population, interspecific and community levels. BIOL 358 is the laboratory for this lecture course.
Prerequisite: BIOL 112 or approval of instructor.

BIOL 358 Ecology Laboratory
Credit 1. 3 Lab Hours.

BIOL 388 Principles of Animal Physiology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Introduction to how animals function, including basics of neurophysiology, endocrinology, muscular, cardiovascular, respiratory, ormoregulatory, and metabolic physiology; broadly comparative in scope and encompassing adaptation of physiological systems to diverse environments; the laboratory stresses techniques used for monitoring and investigating physiological mechanisms and responses to environmental changes.
Prerequisites: BIOL 112; CHEM 228.

BIOL 395 Directed Investigation in Bioinformatics
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Second course of four in capstone research program in biology; conduct individual research projects utilizing bioinformatic tools.
Prerequisite: BIOL 213 or approval of instructor.

BIOL 400 Tropical Ecology Costa Rica
Credits 6. 2 Lecture Hours. 12 Lab Hours.
Advanced field course taught at multiple field stations in Costa Rica; emphasis on biological, ecological, natural history and philosophical attributes of tropical ecosystems; includes planning and conducting a field-oriented research project, and presentation of results.
Prerequisites: BIOL 300 and approval of instructor; junior or senior classification.

BIOL 401 Critical Writing in Biology
Credit 1. 1 Lecture Hour.
Reading scientific papers and writing short synopses of papers with a focus on learning how to think and write like a scientist; fills the current Writing Intensive "W" course requirement for biology.
Prerequisites: BIOL 213 and BIOL 214; junior or senior classification.

BIOL 405 Comparative Endocrinology
Credits 3. 3 Lecture Hours.
Basic principles of endocrinology including structure and functions of hormones in vertebrates; hormonal control of growth, metabolism, osmoregulation, and reproduction; endocrine techniques and mechanism of hormone action.
Prerequisites: BIOL 213 and CHEM 227; BIOL 320 or BIOL 388 strongly recommended.
BIOL 406/GENE 406 Bacterial Genetics
Credits 3. 3 Lecture Hours.
A problem oriented course surveying the manipulation and mechanisms of genetic systems in bacteria; recombination, structure and regulation of bacterial genes, plasmids and phages.
Prerequisites: BIOL 351; GENE 302.
Cross Listing: GENE 406/BIOL 406.

BIOL 413 Cell Biology
Credits 3. 3 Lecture Hours.
Structure, function, and biogenesis of cells and their components; interpretation of dynamic processes of cells, including protein trafficking, motility, signaling and proliferation.
Prerequisites: BIOL 213 and BICH 410.

BIOL 414 Developmental Biology
Credits 3. 3 Lecture Hours.
Concepts of development in systems ranging from bacteriophage to the mammalian embryo; use of recombinant DNA technology and embryo engineering to unravel the relationships between growth and differentiation, morphogenesis and commitment, aging and cancer.
Prerequisite: BIOL 413 or concurrent enrollment or approval of instructor.

BIOL 423 Cell Biology Laboratory
Credit 1. 3 Lab Hours.
Modern methods of study of cell structure and cell function.
Prerequisites: BIOL 413 and BICH 412 or registration therein; approval of instructor.

BIOL 430 Biological Imaging
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Still and video photography and photomicrography, computer-based digital image analysis and processing of biological images; theory and principles of light and electron microscopy including transmission and scanning electron microscopy; optical contrast methods for light microscopy including phase contrast, DIC, polarizing light and confocal laser scanning microscopy.
Prerequisite: Junior classification or approval of instructor.

BIOL 434/NRSC 434 Regulatory and Behavioral Neuroscience
Credits 3. 3 Lecture Hours.
Cell biology and biophysics of neurons; functional organization of the vertebrate nervous system; physiological basis of behavior.
Prerequisites: BIOL 319 or BIOL 388 or PSYC 335/NRSC 335; BIOL 213 strongly recommended.
Cross Listing: NRSC 434/BIOL 434.

BIOL 435 Laboratory for Regulatory and Behavioral Neuroscience
Credit 1. 3 Lab Hours.
Study of modern methods and tools used to investigate nervous system structure and function.
Prerequisite: Approval of instructor.

BIOL 437 Molecular and Human Medical Mycology
Credits 3. 3 Lecture Hours.
Principles of fungal pathogenesis, diagnosis and antifungal therapies, and relevant genetic and molecular tools for studying human pathogens and drug delivery.
Prerequisites: BIOL 351; junior or senior classification; or approval of instructor.

BIOL 438 Bacterial Physiology
Credits 4. 4 Lecture Hours.
Structure and function of prokaryotic cells, with emphasis on evolutionary adaptations to different environmental, developmental, and pathogenic selections pressures; formation of teams and preparation of presentations on specific topics in microbiology.
Prerequisites: BIOL 351 and BIOL 406/GENE 406; BICH 410, BICH 431/GENE 431 and GENE 302 strongly recommended.

BIOL 440 Marine Biology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Introduction to biology of common organisms inhabiting bays, beaches and near-shore oceanic waters with special reference to Gulf of Mexico biota; emphasis on classification, distribution, history, ecology, physiology, mutualism, predation, major community types and economic aspects of marine organisms.
Prerequisite: BIOL 112 or approval of instructor.

BIOL 445 Biology of Viruses
Credits 3. 3 Lecture Hours.
Structure, composition and life cycles of viruses; methods used to study viruses; their interaction with host cells; mechanisms of pathogenicity and cellular transformation; responses of the host to viral infection, and vaccine applications; in-depth study of the life cycles of the major classes of viruses and discussion of emerging viruses.
Prerequisite: BIOL 213 or BIOL 351 or approval of instructor.

BIOL 450/BICH 450 Genomics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
The study of genomic data includes consideration of the logic behind the most important genomic approaches, as well as their capabilities and limitations in investigating biological processes; the science of accessing and manipulating genomic data; and practical applications, including development of an hypotheses-driven datamining experiment.
Prerequisites: BIOL 213, GENE 301 or GENE 302, BICH 431/GENE 431 or GENE 431/BICH 431, or BIOL 351; junior or senior classification or approval of instructor.
Cross Listing: BICH 450/BIOL 450.

BIOL 451 Bioinformatics
Credits 3. 3 Lecture Hours.
Introduction to the entire field of bioinformatics; theoretical background of computational algorithms, with an emphasis on application of computational tools related to modern molecular biological research.
Prerequisite: Junior or senior classification, or approval of instructor.

BIOL 452 Fungal Functional Genomics
Credits 4. 3 Lecture Hours. 4 Lab Hours.
Extensive research experience in eukaryotic molecular genetics using the fungus Neurospora crassa as the primary model system; analysis of Neurospora gene-deletion strain collection to examine the effects of genes on the organism’s traits; introduction of molecular techniques for genome manipulation and analysis.
Prerequisite: Junior or senior classification in any life science major or approval of instructor.

BIOL 454 Immunology
Credits 3. 3 Lecture Hours.
Introduction to basic immunological concepts and principles of serology.
Prerequisite: BIOL 351 or equivalent or approval of instructor.
BIOL 455 Laboratory in Immunology
Credits 2. 6 Lab Hours.
Practical application of serological principles which include precipitation, agglutination and blood banking principles; techniques in tissue culture and hybridoma technology also included.
Prerequisite: BIOL 454 or registration therein.

BIOL 456 Medical Microbiology
Credits 4. 4 Lecture Hours.
Microbiology, epidemiology and pathology of human pathogens with an emphasis on bacterial agents.
Prerequisite: BIOL 351 or approval of instructor.

BIOL 461 Antimicrobial Agents
Credit 1. 1 Lecture Hour.
Understanding of antimicrobial agents, limitations of use, biosynthesis and regulation, and challenges in development as new therapeutics.
Prerequisites: BICH 410 or BICH 440 and BIOL 351 or VTPB 405.

BIOL 463 Epigenetic Mechanisms and Inheritance
Credits 3. 3 Lecture Hours.
Knowledge of chromatin structure, the mechanisms of chromatin inheritance and the consequences of heritable chromatin structures on gene expression; phenomenology, molecular underpinnings and evolutionary implications.
Prerequisite: Junior or senior classification or approval of instructor.

BIOL 466 Principles of Evolution
Credits 3. 3 Lecture Hours.
Evolutionary patterns, mechanisms and processes at the organismal, chromosomal and molecular levels; modes of adaptation and the behavior of genes in populations.
Prerequisite: GENE 302 or approval of instructor.

BIOL 467 Integrative Animal Behavior
Credits 3. 3 Lecture Hours.
Examines how behavior contributes to survival and reproduction, and how evolutionary history and ecological circumstance interact to shape the expression of behavior; focus on integrative nature of behavior: how the interaction of evolutionary processes, mechanistic constraints, and ecological demands determine behavioral strategies.
Prerequisite: Any one of the following: BIOL 214, BIOL 357, BIOL 388, BIOL 405, BIOL 434/NRSC 434, BIOL 466, or approval of instructor.

BIOL 481 Seminar in Biology
Credit 1. 1 Lecture Hour.
Recent advances. Restricted to senior undergraduate majors in biology, microbiology, botany or zoology.

BIOL 484 Internship
Credits 0 to 4. 0-1 Other Hours.
Directed internship in a private firm or public agency to provide research experience appropriate to the student's degree program and career objectives. May be taken two times.
Prerequisite: Approval of internship agency and advising office.

BIOL 485 Directed Studies
Credits 1 to 12. 1 to 12 Other Hours.
Problems in various phases of plant, animal and bacteriological science.
Prerequisites: Junior classification; approval of ranking professor in field chosen and Undergraduate Advising Office.

BIOL 487/VTPB 487 Biomedical Parasitology
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Helminth and protozoan parasites of medical and veterinary importance; life cycles, morphology, taxonomic classification, economic and public health aspects and current topics in parasitic diseases.
Prerequisites: BIOL 107 or BIOL 112; junior or senior classification or approval of instructor.
Cross Listing: VTPB 487/BIOL 487.

BIOL 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 10 Lab Hours.
Selected topics in an identified area of biology. May be repeated once for credit.

BIOL 491 Research
Credits 0 to 4. 0-1 Other Hours.
Active research of basic nature under the supervision of a Department of Biology faculty member. May be taken two times. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisite: Approval of departmental faculty member.

BIOL 493 Independent Bioinformatics Research
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Third course of four in capstone research program in biology; continuation of research projects utilizing bioinformatic tools.
Prerequisite: BIOL 395 or approval of instructor.

BIOL 495 Biology Capstone: Research Communication in the Life Sciences
Credits 2. 2 Lecture Hours.
Culmination of capstone research experience; formalization of research results in written and oral forms; introduction to primary genres or scientific writing; apply principles of rhetoric and composition to diverse methods of professional communication.
Prerequisite: BIOL 452, BICH 464, BIOL 400, BIOL 493 or BIOL 491 or approval of instructor.

BIOL 601/NRSC 635 Biological Clocks
Credits 3. 3 Lecture Hours.
Introduction to the formal properties of biological rhythms; cellular and molecular bases for rhythmicity; temporal adaptations of organisms using clocks.
Prerequisite: Graduate classification or approval of instructor.
Cross Listing: NRSC 635/BIOL 601.

BIOL 602/MSEN 612 Fundamentals of Transmission Electron Microscopy
Credits 3. 2 Lecture Hours. 6 Lab Hours.
State-of-the-art fundamentals in transmission electron microscopy (TEM); theoretical background supporting a strong hands-on course component comprising specimen preparation and image acquisition/interpretation; practical experience to attain a proficiency level permitting independent operation of transmission electron microscopes in the Microscopy and Imaging Center.
Prerequisite: Students are required to write a half-page summary describing the specific problem they wish to resolve using transmission electron microscopy
Cross Listing: MSEN 612/BIOL 602.
BIOL 603/MSEN 613 Advanced TEM Methodologies in Life and Material Sciences (TEM II)
Credits 3. 1 Lecture Hour. 6 Lab Hours.
Advanced TEM methodologies including specimen preparation and TEM imaging/analysis techniques as applicable to both biological and material samples; theory designed to support a strong hands-on component comprising specimen preparation, different imaging/diffraction/spectroscopic techniques and data interpretation.
Prerequisites: BIOL 602/MSEN 612; graduate classification.
Cross Listing: MSEN 613/BIOL 603.

BIOL 604/MSEN 614 Fundamentals of Scanning Electron Microscopy and Environmental Scanning Electron Microscopy
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Fundamentals of Scanning Electron Microscopy (SEM) and Environmental Scanning Electron Microscopy (ESEM). Provides biologists, material scientists, and students from other disciplines with the techniques of operation of the scanning electron microscope (SEM) and the environmental SEM (ESEM) coupled with the appropriate theoretical background knowledge; individual instruction in support of their research endeavors involving SEM/ESEM.
Prerequisite: Graduate classification.
Cross Listing: MSEN 614/BIOL 604.

BIOL 606 Microbial Genetics
Credits 3. 3 Lecture Hours.
Basic understanding of microbial genetic systems and how genetic analyses can be used to investigate fundamental biological processes in bacteria.
Prerequisite: Approval of instructor.

BIOL 608 Theory and Applications of Light Microscopy
Credits 3. 3 Lecture Hours. 3 Lab Hours.
Provides biologists, material scientists and students from other disciplines with the theoretical background and practical techniques of sample preparation, operation of light microscopes as well as image acquisition and processing; individual instruction which facilitates the completion of their research projects involving light microscopic techniques.
Prerequisite: half-page write-up describing how their graduate work will benefit.

BIOL 609 Molecular Tools in Biology
Credits 3. 3 Lecture Hours.
Interactive lecture course in molecular biology for beginning graduate students; introduction to tools and methodologies used in prokaryotic and eukaryotic molecular labs; choosing the appropriate experimental technique for a given scientific question; virtual experiments will reinforce the applications and introduce useful bioinformatics tools.
Prerequisite: Graduate classification.

BIOL 610 Evolution
Credits 3. 3 Lecture Hours. 0 Lab Hours.
Fundamentals of evolutionary biology with an emphasis on evolutionary theory.
Prerequisite: Graduate classification or approval of instructor.

BIOL 611 Developmental Genetics
Credits 3. 3 Lecture Hours.
Major paradigms of eukaryotic gene regulation in terms of the role of gene expression during ontogeny and the effect of dysfunction in these processes on the neoplastic state.

BIOL 613 Cell Biology
Credits 3. 3 Lecture Hours.
Consideration of the eukaryotic cell as a functional, integrated unit in living organisms: structure, composition, function and biogenesis of subcellular components; dynamic processes and interactions of cells, including division, communication, and death; experimental approaches in modern cell biology and selected applications of experimental cell biology to problems in medicine.
Prerequisite: BICH 410 or BIOL 213. Concurrent enrollment in BIOL 213 or BICH 410 strongly discouraged.

BIOL 615/NRSC 636 Signaling in Behavior and Development
Credits 3. 3 Lecture Hours.
Will focus on signaling pathways used in multicellular animals. In each lecture, major signaling pathways used in behavior, physiology, and development will be introduced at the molecular level, and then be discussed in the context of organismal biology.
Prerequisite: Graduate classification.
Cross Listing: NRSC 636/BIOL 615.

BIOL 622 Microbial Physiology
Credits 3. 3 Lecture Hours.
An area of microbial physiology will be explored at the molecular, cellular, and genetic levels through reading and discussion of classic and current research literature. The area of focus may change from semester to semester. May be taken three times for credit with approval of instructor.
Prerequisite: Graduate classification.

BIOL 625 Structural and Molecular Biology
Credits 3. 3 Lecture Hours.
Successfully integrate structural knowledge into areas of interest; literature examples used to integrate structural information from large macromolecular complexes to single proteins with functional information obtained through other methods.
Prerequisite: Graduate classification or approval of instructor.

BIOL 627/NRSC 601 Principles of Neuroscience I
Credits 3. 3 Lecture Hours.
Detailed introduction to the basic fundamentals of cellular and molecular neuroscience; topics include membrane potentials, action potential generation, and the mechanisms underlying synaptic transmission, as well as their molecular basis.
Prerequisites: Graduate classification or approval of instructor.
Cross Listing: NRSC 601/BIOL 627.

BIOL 628/NRSC 602 Principles of Neuroscience II
Credits 3. 3 Lecture Hours.
Fully integrated overview of nervous system organization and systems-level neurobiology; broad topics include sensory systems and sensory systems function, motor systems and neuromuscular function, central pattern generation and locomotion, homeostatic regulation, motivation, emotions, learning and memory, and circadian rhythms.
Prerequisites: Graduate classification or permission of instructor.
Cross Listing: NRSC 602.

BIOL 634/NRSC 634 Comparative Neurobiology
Credits 3. 3 Lecture Hours.
Cellular, molecular and systems neurobiology, together with neuroethology. A comparative approach to subject matter is stressed. Topics such as evolution of nervous systems and their diverse structure and complex functions are dealt with.
Cross Listing: NRSC 634/BIOL 634.
**Course Descriptions**

**BIOL 635 Plant Molecular Biology**  
**Credits 3. 3 Lecture Hours.**  
Molecular aspects of plant growth, development, reproduction and evolution, emphasizing the structure, function, regulation, interaction and manipulation of plant genes; practical applications of plant molecular biology.  
**Prerequisite:** GENE 431/BICH 431.

**BIOL 644/NRSC 644 Neural Development**  
**Credits 3. 3 Lecture Hours.**  
Classical and current research literature to explore the major events in the development of a nervous system, including topics ranging from neurogenesis to synapse information.  
**Prerequisite:** Graduate classification.  
**Cross Listing:** NRSC 644/BIOL 644.

**BIOL 650/BICH 650 Genomics**  
**Credits 3. 3 Lecture Hours.**  
Modern genomics as a tool for understanding biological systems; review of gene structure and organization and the history of sequencing technologies; focus on transcriptional, translational and functional genomics.  
**Prerequisite:** Graduate classification or approval of instructor.  
**Cross Listing:** BICH 650/BIOL 650.

**BIOL 651 Bioinformatics**  
**Credits 3. 3 Lecture Hours.**  
Introduction to applications related to information processing in biological research with practical training exercises; includes internet databases, sequence alignment, motif prediction, gene and promoter prediction, phylogenetic analysis, protein structure classification, analysis and prediction, genome annotation, assembly and comparative analysis, and proteomics analysis.  
**Prerequisite:** Graduate classification or approval of instructor.

**BIOL 652 Epigenetic Mechanisms**  
**Credits 3. 3 Lecture Hours.**  
Lectures and discussion of current research in epigenetic inheritance and its mechanisms in a variety of organisms. Structure of the course includes paper discussion and presentation, grant-writing, and grant-review.  
**Prerequisite:** BICH 631/GENE 631.

**BIOL 661 Antimicrobial Agents**  
**Credit 1. 1 Lecture Hour.**  
Understanding of microbial agents, limitations of use, biosynthesis and regulation, and challenges in development as new therapeutics.  
**Prerequisite:** Approval of instructor.

**BIOL 663 Biology of the Crustacea**  
**Credits 4. 3 Lecture Hours. 3 Lab Hours.**  
Classification, life history, morphology, physiology, ecology, diseases, parasites and predators of crustaceans; economic aspects of crustaceans; original literature emphasized.  
**Prerequisite:** BIOL 335 or equivalent, or approval of instructor.

**BIOL 665 Biology of Invertebrates**  
**Credits 4. 3 Lecture Hours. 3 Lab Hours.**  
Morphology, biology and phylogeny of invertebrates. Topics may be either detailed discussions of specific organisms or comparative information on a process.  
**Prerequisite:** BIOL 335 or equivalent.

**BIOL 681 Seminar**  
**Credit 1. 1 Lecture Hour.**  
Detailed reports on specific topics in field chosen. Students may register in up to but no more than three sections of this course in the same semester.

**BIOL 682 Research Seminar**  
**Credit 1. 1 Other Hour.**  
Seminars presented by students based upon their research projects.  
**Prerequisite:** Graduate classification.

**BIOL 685 Directed Studies**  
**Credits 1 to 8. 1 to 8 Other Hours.**  
Limited investigations in fields other than those chosen for thesis or dissertation.  
**Prerequisite:** Graduate classification.

**BIOL 689 Special Topics in...**  
**Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.**  
Selected topics in an identified area of biology.  
**Prerequisite:** Graduate classification.

**BIOL 691 Research**  
**Credits 1 to 23. 1 to 23 Other Hours.**  
Research for thesis or dissertation.

**BIOL 697 Methods in Teaching Biology Laboratory**  
**Credit 1. 1 Lecture Hour.**  
Introduction to research and laboratory methods associated with the teaching of undergraduate biology laboratories; emphasis on effective preparation and delivery of laboratory course content, clear instructions for procedures and laboratory safety.  
**Prerequisite:** Graduate classification in a biological science.

**BIOL 698/NRSC 698 Special Topics Behavior, Genes and Evolution**  
**Credits 3. 3 Lecture Hours.**  
This literature and lecture-based course will introduce an integrative approach to the study of animal behavior, complementing evolutionary and ecological perspectives with molecular and genetic approaches and methodologies.  
**Prerequisite:** Graduate classification.  
**Cross Listing:** NRSC 698/BIOL 698.

**BMEN - Biomedical Engineering**

**Courses**

**BMEN 101 Introduction to Biomedical Engineering**  
**Credit 1. 1 Lecture Hour.**  
Overview of biomedical engineering and the biomedical engineering industry, including specialties, degree requirements and scholastic programs in the Department of Biomedical Engineering.  
**Prerequisite:** Freshman or sophomore classification.

**BMEN 207 Computing for Biomedical Engineering**  
**Credits 3. 2 Lecture Hours. 3 Lab Hours.**  
Introduction to the principles of computer programming for biomedical applications including program design and development, programming techniques and documentation; introduction to and programming in the LabVIEW and MATLAB environments.  
**Prerequisite:** Admitted to major degree sequence; PHYS 208, CHEM 101/111, MATH 152, ENGR 112.

**BMEN 211 Biomedical Applications of Circuits, Signals and Systems**  
**Credits 3. 3 Lecture Hours.**  
Quantitative analysis of biomedical and physiological signals; A/D conversion and sampling; Fourier and Laplace transforms; filtering of biomedical signals and images; electrical circuits and analog representations of physiological systems as model systems.  
**Prerequisites:** Admitted to major degree sequence in biomedical engineering, BMEN 207, MATH 308 or concurrent enrollment, or approval of instructor.
BEN 231 Foundations of Biomechanics
Credits 3. 3 Lecture Hours.
Introduction to biomechanics in formulating and solving problems in basic science, medical device development, and clinical intervention: emphasis on deriving differential equations in one spatial dimension for the five basic postulates of continuum biomechanics, identifying illustrative constitutive relations, and providing a unified approach to studying biosolid mechanics, biofluid mechanics, bioheat and mass transport, and biothermomechanics. **Prerequisite:** Admitted to major degree sequence in biomedical engineering.

BEN 253 Medical Device Design I
Credit 1. 3 Lab Hours.
FDA design controls for medical device development in a regulated environment; small-scale team biomedical engineering design project. **Prerequisites:** Admitted to major degree sequence in biomedical engineering; VTPP 434; or approval of instructor.

BEN 282/CHEN 282 Engineering Biology
Credits 3. 3 Lecture Hours.
Application of engineering principles to biological function at the molecular and cellular level. **Prerequisites:** Admitted to major degree sequence and CHEM 101 and 111 or CHEM 107 and 117. **Cross Listing:** CHEN 282.

BEN 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Permits students to undertake special projects in biomedical engineering at an earlier point in their studies than required for BEN 485. **Prerequisite:** Approval of Director of Undergraduate Programs.

BEN 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of biomedical engineering. May be repeated for credit. **Prerequisite:** Approval of instructor.

BEN 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in biomedical engineering. May be repeated 2 times for credit. **Prerequisites:** Freshman or sophomore classification and approval of instructor.

BEN 305 Bioinstrumentation
Credit 1. 3 Lab Hours.
Introduction to biomedical instrumentation design; hands on acquisition of biomedical signals; design, building and testing of bioinstrumentation circuits including analog signal amplifiers and analog filter circuits. **Prerequisites:** Admitted to major degree sequence in biomedical engineering; BEN 211, VTPP 434 and 435; junior or senior classification; or approval of instructor.

BEN 306 Biomeasurements Lab
Credit 1. 3 Lab Hours.
Introduction into experimental methods useful in biomedical engineering; includes the role of empiricism in biomedical research and development; the differences between observation and experimentation; and how to acquire, reduce, interpret, and present data. **Prerequisites:** Admitted to major degree sequence in biomedical engineering; BEN 240 and BEN 341.

BEN 310 Clinical Engineering
Credits 3. 3 Lecture Hours.
Equipment control concepts and techniques and their application in hospitals and in the medical profession; device evaluation specifications; preventative maintenance and service; calibration, regulation and medical product liability. **Prerequisites:** Admitted to major degree sequence in biomedical engineering; BEN 321.

BEN 321 Biomedical Electronics
Credits 3. 3 Lecture Hours.
Introduction to biomedical signals; basic circuit analysis for biomedical signals; design of bioamplifier circuits; characteristics of linear and nonlinear circuit elements; design of basic electronic circuits, principles and practice of bioelectric measurements. **Prerequisites:** BEN 211; VTPP 435; junior or senior classification; or approval of instructor.

BEN 322 Biosignal Analysis
Credits 3. 3 Lecture Hours.
Design and application of analog and digital signal analysis in biomedical engineering; characteristics of biomedical signals; design considerations for analog-to-digital and digital-to-analog circuitry; biosignal transformation methods; analog and digital filter design for biomedical signals. **Prerequisites:** BEN 321, VTPP 434 and VTPP 435; junior or senior classification.

BEN 341 Biofluid Mechanics
Credits 3. 3 Lecture Hours.
Introduction into the mechanics of fluids in biomechanics, including blood, synovial fluid and physiological solutions, with an emphasis on the importance of mechanobiology and the formation of biological problems within the context of 1) kinematics, 2) the concept of stress, 3) linear momentum balance, 4) constitutive relations, and 5) boundary conditions. **Prerequisites:** Admitted to major degree sequence in biomedical engineering; VTPP 435; MATH 308; junior or senior classification; or approval of instructor.

BEN 342 Biomaterials and Medical Devices
Credits 3. 3 Lecture Hours.
Selection and use of materials in implantable and tissue contacting medical devices; mass transport in medical devices; regulation and testing of medical devices. **Prerequisites:** VTPP 435 and BEN 341; junior or senior classification.

BEN 343 Introduction to Biomaterials
Credits 3. 3 Lecture Hours.
Properties of natural and man-made materials commonly encountered in biomedicine and biomedical engineering; an integrated approach in the presentation of material structures, characteristics and properties; the basics of material structures, including crystalline and chemical structure, and microstructure; and bulk properties and characteristics of the materials developed from the microscopic origins. **Prerequisites:** Admitted to major degree sequence in biomedical engineering; VTPP 435; MATH 308; junior or senior classification; or approval of instructor.

BEN 344 Biological Responses to Medical Devices
Credits 3. 3 Lecture Hours.
Selection and characterization of materials in implantable and tissue contacting medical devices; biodegradation, biocompatibility, hemocompatibility and cell-material interactions of biomaterials. **Prerequisites:** Basic knowledge of biomaterials, cell biology, human anatomy/physiology and engineering principles (VTPP 435 or equivalent); BEN 343 highly recommended.
BMEN 345 Biomaterials Lab  
Credit 1. 3 Lab Hours.  
Experimental methods used to prepare and characterize polymeric biomaterials used in biomedical engineering; related fundamental aspects of forming a hypothesis, experimental design, empirical observation, data collection, interpretation and presentation of data.  
Prerequisite: BMEN 343.

BMEN 350 Statistics for Biomedical Engineering  
Credits 3. 3 Lecture Hours.  
Evaluation of the efficacy of clinical research; quantitative methods used in clinical trials in biomedical engineering; ethical and regulatory issues that must be considered during the design and implementation of any clinical trial, or pre-clinical study.  
Prerequisites: Junior classification; admitted to the major degree sequence (upper level).

BMEN 353 Medical Device Design II  
Credit 1. 3 Lab Hours.  
Identification of needs for biomedical engineering design solutions, development of design proposals, analysis of design project requirements and constraints.  
Prerequisite: BMEN 253 or equivalent; junior or senior classification.

BMEN 361 Biosolid Mechanics  
Credits 3. 3 Lecture Hours.  
Introduction to the mechanics of deformable media in biomedical engineering, including medical devices, biomaterials, and soft and hard biological tissues: emphasis on biomechanics and mechanobiology and formulation of problems within the context of basic continuum biomechanics; problems include analytical solutions for stress-strain analysis of extension, distension, bending, buckling, and torsion of biosolids.  
Prerequisites: Admitted to major degree sequence in biomedical engineering; BMEN 341.

BMEN 400/VTPP 401 History of Human and Veterinary Medicine in Europe  
Credits 4. 4 Lecture Hours.  
Addresses the major developments in human and veterinary medicine in Europe from the Middle Ages to the present; explores key events and figures in medical history and analyzes issues of current biomedical concern in a historical context; for example, animal rights, ethics of humane experimentation, euthanasia.  
Prerequisites: Admitted to major degree sequence in biomedical engineering; VTPP 434.  
Cross Listing: VTPP 401.

BMEN 401 Principles and Analysis of Biological Control Systems  
Credits 3. 3 Lecture Hours.  
Techniques for generating quantitative mathematical models of physiological control systems and devices; the behavior of physiological control systems using both time and frequency domain methods.  
Prerequisites: BMEN 321; MATH 308; VTPP 434 and VTPP 435.

BMEN 402 Biomedical Optics Laboratory  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Biomedical optics technology; basic engineering principles used in developing therapeutic and diagnostic devices; hands-on labs including optical monitoring, diagnostic and therapeutic experiments.  
Prerequisite: PHYS 208 or approval of instructor.

BMEN 404 FDA Good Laboratory and Clinical Practices  
Credits 3. 3 Lecture Hours.  
Implementation of Good Laboratory Practices (GLP) for the submission of preclinical studies and use of Good Clinical Practices (GCP) in clinical trials in accordance with Food and Drug Administration (FDA) regulations; includes similarities and differences in GLP and GCP critical for the introduction of new drugs and medical devices.  
Prerequisites: Admitted to major degree sequence and BMEN 430; junior or senior classification.

BMEN 405 Virtual Instrumentation Design for Medical Systems  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Design of medical systems using graphics programming language of LabVIEW including the designing and programming of three virtual systems as follows: cardiac monitor, electromyogram system for biomechanics, and sleep stage analyses from electroencephalograms.  
Prerequisites: BMEN 321 and BMEN 322.

BMEN 406 Medical Device Path to Market  
Credits 3. 3 Lecture Hours.  
Path to market for a medical device with specific attention to the regulatory affairs to enable the development of an appropriate regulatory strategy due to the highly regulated global environment.  
Prerequisites: Admission into degree sequence of the major and junior or senior classification or approval of instructor.

BMEN 420 Medical Imaging  
Credits 3. 3 Lecture Hours.  
The principles of the major imaging modalities including x-ray radiography, x-ray computed tomography (CT), ultrasonography and magnetic resonance imaging; including a brief discussion on other emerging imaging technologies such as nuclear imaging (PET and SPECT).  
Prerequisites: Admitted to major degree sequence in biomedical engineering; MATH 308; junior or senior classification; or approval of instructor.

BMEN 422 Bioelectromagnetism  
Credits 3. 3 Lecture Hours.  
Electric, magnetic and electromagnetic phenomena associated with biological tissues; source modeling based on physiological current including line and volume conductor models as well as electromagnetic-based stimulation, sensing and imaging.  
Prerequisites: Admission into the degree sequence of the major and BMEN 321 or approval of instructor.

BMEN 423 Microscale Bio-Optic Applications  
Credits 3. 3 Lecture Hours.  
Introduction to biomedical applications of lasers to manipulation, detection and visualization on (sub-) cellular length scales; emphasis on the governing principles on which applications are founded; includes applications from recent literature.  
Prerequisites: BMEN 306 and BMEN 322; junior or senior classification.

BMEN 424 Biomedical Sensing and Imaging at the Nanoscale  
Credits 3. 3 Lecture Hours.  
Introduction to nanotechnology with an emphasis on biomedical techniques and medical applications; basic physics of contrast agents to the engineering of current sensing and imaging systems applied at the nanoscale.  
Prerequisite: Senior classification or approval of instructor.
BMEN 425 Biophotonics
Credits 3. 3 Lecture Hours.
Theory and application of optical instrumentation, including light sources, lasers, detectors, and optical fibers; instrumentation and engineering in biomedical applications of optics in therapeutics, diagnostics, and biosensing.
Prerequisites: BMEN 240, PHYS 208 and MATH 308.
BMEN 430 Medical Device Regulation
Credits 3. 3 Lecture Hours.
Introduction to the regulations of the U.S. Food and Drug Administration pertaining to testing and marketing medical devices.
Prerequisites: BMEN 310; junior or senior classification.
BMEN 431 Thermodynamics of Biomolecular Systems
Credits 3. 3 Lecture Hours.
Introduces equilibrium and non-equilibrium statistical mechanics and applies them to understand various biomolecular systems; including ensemble theory, reaction kinetics, nonlinear dynamics and stochastic processes; applied examples such as enzyme-ligand binding kinetics, conformational dynamic of proteins and nucleic acids, population dynamics, and noise in biological signals.
Prerequisites: BMEN 240, PHYS 208 and MATH 308.
BMEN 432 Molecular and Cellular Biomechanics
Credits 3. 3 Lecture Hours.
Introduces biomolecules and their assemblies that play structural and dynamical roles in subcellular to cellular level mechanics; emphasis on quantitative/theoretical descriptions; discussions of the relevant experiment approaches to probe these nano to micro-scale phenomena; includes topics in self-assembly of cytoskeleton and biomembranes, molecular motors, cell motility, and mechanotransduction.
Prerequisites: BMEN 240, MATH 304; junior or senior classification.
BMEN 440 Design of Medical Devices
Credits 3. 3 Lecture Hours.
Overview of the multiple issues in designing a marketable medical device, including the design process from clinical problem definition through prototype and clinical testing to market readiness; includes FDA regulation, human factors and system safety considerations and medical product liability.
Prerequisites: BMEN 342; senior classification in engineering.
BMEN 450 Case Studies
Credit 1. 1 Lecture Hour.
Examines process through which clinically defined problems are addressed from the perspective of biomedical engineering through the use of case studies; includes issues of technology transfer and clinical evaluation.
Prerequisites: BMEN 361, BMEN 305 and BMEN 344; junior or senior classification; or approval of instructor.
BMEN 451 Cell Mechanobiology
Credits 3. 3 Lecture Hours.
Focus on how mechanical forces influence cell behavior through physical and biochemical mechanisms; integration of engineering and cell biology to solve biomedical problems, which includes developing models for applying forces to cultured cells and tissues and measuring changes in cell biochemistry, structure, and function.
Prerequisites: BMEN 282/CHEN 282 and admitted to major degree sequence in biomedical engineering.
BMEN 452 Mass and Energy Transfer in Biosystems
Credits 3. 3 Lecture Hours.
Transport phenomena associated with physiological systems and their interaction with medical devices; exchange processes in artificial life support systems and diagnostic equipment.
Prerequisites: BMEN 341; MATH 308; VTPP 434 and VTPP 435.
BMEN 453 Analysis and Design Project I
Credits 2. 2 Lecture Hours.
Group or team biomedical engineering analysis and design project involving statement, alternative approaches for solution, specific system analysis and design.
Prerequisites: BMEN 321, BMEN 322; BMEN 344; BMEN 253 and BMEN 353; senior classification or approval of instructor.
BMEN 454 Analysis and Design Project II
Credits 2. 2 Lecture Hours.
Continuation of BMEN 453.
Prerequisites: BMEN 321, BMEN 322, BMEN 344 and BMEN 453; senior classification; or approval of instructor.
BMEN 457 Orthopedic Biomechanics
Credits 3. 3 Lecture Hours.
Development of competencies in biomechanical principles using practical examples and clinical case studies; application of biomechanical knowledge to the evaluation of musculoskeletal tissues and structures, and treatment options for musculoskeletal dysfunction.
Prerequisites: Admitted to major degree sequence in biomedical engineering; junior or senior classification.
BMEN 460 Vascular Mechanics
Credits 3. 3 Lecture Hours.
Application of continuum mechanics to the study of the heart arteries; emphasis on the measurement and quantification of material properties, and the calculation of vascular stresses; analysis of several cardiovascular devices to reinforce the need for careful analysis in the device design.
Prerequisites: BMEN 240.
BMEN 461 Cardiac Mechanics
Credits 3. 3 Lecture Hours.
Application of continuum mechanics and computational solid mechanics to the study of the mammalian heart; utilization of continuum mechanics and finite element analysis in solving non-linear boundary value problems in biomechanics.
Prerequisites: BMEN 240, BMEN 341, and BMEN 463; approval of instructor.
BMEN 462 Vascular Fluid Mechanics
Credits 3. 3 Lecture Hours.
Bio-fluid mechanics of the human circulatory system including examination of disease development and medical treatments.
Prerequisites: BMEN 240 or equivalent; junior or senior classification.

BMEN 463 Soft Tissue Mechanics and Finite Element Methods
Credits 3. 3 Lecture Hours.
Application of continuum mechanics and finite element methods to the study of the mechanical behavior of soft tissues and associative applications in biomedicine.
Prerequisites: BMEN 240 or equivalent; junior or senior classification.

BMEN 465 Biomechanics Experiential Learning Lab
Credit 1. 3 Lab Hours.
Applications in biomechanics (solid and fluid); includes experimental methods used to investigate biomechanical factors in the assessment of therapeutic interventions; mechanical testing load frames; motion capture systems, high speed imaging and flow systems; hypothesis forming, experimental design, empirical observation, data collection and interpretation, and presentation of results.
Prerequisites: Admitted to major degree sequence in biomedical engineering; junior or senior classification or approval of instructor.

BMEN 468 Advanced Biomechanics
Credits 3. 3 Lecture Hours.
Application of fluid and solid mechanics to problems in biomedical engineering ranging from molecular-level to organ-level, including the mechanics of the cell cytoskeleton, whole cells, blood, arteries and the heart.
Prerequisites: Admitted to major degree sequence in biomedical engineering; BMEN 241 or approval of instructor.

BMEN 469 Entrepreneurial Issues in Biomedical Engineering
Credits 3. 3 Lecture Hours.
Description and analysis of issues associated with initiating business ventures to transfer biomedical technologies into the health care sector, including intellectual property protection, seed funding alternatives, and business strategies relevant to the biomedical engineering technology area; utilizing recent case studies of previous ventures.
Prerequisite: Admitted to major degree sequence (upper-level) in biomedical engineering.

BMEN 470/CHEN 470 Introduction of Biomedical Optics
Credits 3. 3 Lecture Hours.
Fundamentals of biomedical optics; basic engineering principles used in optical therapeutics, optical diagnostics and optical biosensing.
Prerequisites: MATH 308, PHYS 208.
Cross Listing: CHEN 470/BMEN 470.

BMEN 471 Numerical Methods in Biomedical Engineering
Credits 3. 3 Lecture Hours.
Application of numerical analysis to analyze molecular, cellular and physiological systems, using general techniques including programming in MATLAB to analyze steady and dynamic systems.
Prerequisites: BMEN 207 and VTPP 434.

BMEN 480 Biomedical Engineering of Tissues
Credits 3. 3 Lecture Hours.
Introduction to aspects of tissue engineering with and emphasis placed on tissue level topics including tissue organization and biological processes, with insights from recent literature (state-of-the-art).
Prerequisite: Admitted to major degree sequence (upper level) in biomedical engineering.

BMEN 482 Polymeric Biomaterials
Credits 3. 3 Lecture Hours.
Preparation, properties, and biomedical applications of polymers including: polymerization; structure-property relationships; molecular weight and measurement; morphology; thermal transitions; network formation; mechanical behavior; polymeric surface modification; polymer biocompatibility and bioadhesion; polymers in medicine, dentistry, and surgery; polymers for drug delivery; polymeric hydrogels; and biodegradable polymers.
Prerequisites: BMEN 342 or approval of instructor; junior or senior classification.

BMEN 483 Polymeric Biomaterial Synthesis
Credits 3. 3 Lecture Hours.
Overview of polymer synthetic routes and key structure-property relationships with emphasis on the design of polymeric systems to achieve specific properties; tissue engineering and drug delivery applications will be used as model systems to explore the process of biomaterial design from synthesis to device evaluation.
Prerequisite: BMEN 343 or approval of instructor.

BMEN 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Permits students to undertake special projects in biomedical engineering.
Prerequisite: Approval of Director of Undergraduate Programs.

BMEN 486 Biomedical Nanotechnology
Credits 3. 3 Lecture Hours.
Nanotechnology applications in biomedicine; concepts of scale; unique properties at the nanoscale; biological interaction, transport, and biocompatibility of nanomaterials; current research and development of nanotechnology for medical applications, including sensors, diagnostic tools, drug delivery systems, therapeutic devices, and interactions of cells and biomolecules with nanostructured surfaces.
Prerequisite: BMEN 343, senior classification or approval of instructor.

BMEN 487 Drug Delivery
Credits 3. 3 Lecture Hours.
Mechanisms for controlled release of pharmaceutically active agents and the development of useful drug delivery systems; controlled release mechanisms including diffusive, convective, and erosive driving forces by using case studies related to oral, topical and parenteral release in a frontier interdisciplinary scientific research format.
Prerequisite: Senior classification in biomedical engineering or approval of instructor.

BMEN 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 1 to 4 Lab Hours.
New or unique areas of biomedical engineering which are of interest to biomedical engineering and other undergraduate students.

BMEN 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in biomedical engineering. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor.
BMEN 604 FDA Good Laboratory and Clinical Practices
Credits 3.3 Lecture Hours.
Implementation of Good Laboratory Practices (GLP) for the submission of preclinical studies and use of Good Clinical Practices (GCP) in clinical trials in accordance with Food and Drug Administration (FDA) regulations; includes similarities and differences in GLP and GCP critical for the introduction of new drugs and medical devices.
Prerequisite: BMEN 430 or BMEN 630 and graduate classification, or approval of instructor.

BMEN 605 Virtual Instrumentation Design for Medical Systems
Credits 3.2 Lecture Hours. 3 Lab Hours.
Design of medical systems using graphics programming language of LabVIEW including the designing and programming of three virtual systems: cardiac monitor, electromyogram system for biomechanics, and sleep stage analyses for electroencephalograms.
Prerequisite: Approval of instructor.

BMEN 606 Medical Device Path to Market
Credits 3.3 Lecture Hours.
Path to market for a medical device with specific attention to the regulatory affairs to enable the development of an appropriate regulatory strategy due to the highly regulated global environment.
Prerequisite: Graduate classification or approval of instructor.

BMEN 607 Clinical Engineering
Credits 3.3 Lecture Hours.
Responsibilities, functions and duties of the hospital based biomedical engineer including program organization, management, medical equipment acquisition and use, preventive maintenance and repair and hospital safety.
Prerequisite: Approval of instructor.

BMEN 608 Optical Diagnostic and Monitoring Principles
Credits 3.3 Lecture Hours.
Principles of optical spectroscopy, including absorption, fluorescence and scattering spectroscopy; emphasis on understanding how light interacts with biological samples and how these interactions can be optically measured, quantified and used for medical diagnosis and sensing.
Prerequisites: MATH 308; PHYS 208.

BMEN 609 Optical Therapeutic and Interventional Principles
Credits 3.3 Lecture Hours.
Study of mechanical and thermal processes of radiation interaction with biological tissue; issues and objectives in therapeutic, surgical, and diagnostic applications; basic engineering principles used in developing therapeutic with a focus on the use of lasers and optical technology.
Prerequisites: MATH 308; PHYS 208.

BMEN 611 Biomedical Imaging Systems
Credits 3.3 Lecture Hours.
The physics behind the major medical imaging systems including CT, MRI, Ultrasound and X-Ray will be introduced and described; a linear systems approach will be used along with basic diffraction theory.
Prerequisites: BMEN 322; MATH 308.

BMEN 620 Bio-Optical Imaging
Credits 3.3 Lecture Hours.
Optical imaging techniques for detection of structures and functions of biological tissues; basic physics and engineering of each imaging technique.
Prerequisite: MATH 308.

BMEN 621 Microscale Bio-Optical Applications
Credits 3.3 Lecture Hours.
Introduction to the biomedical application of lasers to manipulation, detection and visualization on (sub)cellular length scales, with emphasis on governing principles on which applications are founded; applications from recent literature (state-of-the-art) presented.
Prerequisites: Approval of instructor.

BMEN 622 Bioelectromagnetism
Credits 3.3 Lecture Hours.
Electric, magnetic and electromagnetic phenomena in association with biological tissues; source modeling based on physiological current including line and volume conductor models as well as electromagnetic-based stimulation, sensing and imaging.
Prerequisite: Graduate classification or approval of instructor.

BMEN 624 Biomedical Sensing and Imaging at the Nanoscale
Credits 3.3 Lecture Hours.
Introduction to nanotechnology with an emphasis on biomedical techniques and medical applications; material covered ranges from the basic physics of contrast agents to the engineering of current sensing and imaging systems applied at the nanoscale.
Prerequisites: PHYS 208, MATH 308.

BMEN 625 Biophotonics
Credits 3.3 Lecture Hours.
Theory and application of optical instrumentation, including light sources, lasers, detectors, and optical fibers; instrumentation and engineering in biomedical applications of optics in therapeutics, diagnostics, and biosensing.
Prerequisite: Graduate classification or approval of instructor.

BMEN 626 Optical Biosensors
Credits 3.3 Lecture Hours.
Introduction to biosensing principles and detailed analysis of optical methods for transduction; fluorescence-based transduction; molecular recognition of targets; immobilization of sensing reagents; quantitative analysis of sensing systems; design and characterization of sensing assays and associated measurement systems; review of historical and current trends in optical biosensors.
Prerequisite: Approval of instructor.

BMEN 627/ECEN 763 Magnetic Resonance Engineering
Credits 3.2 Lecture Hours. 3 Lab Hours.
Design, construction and application of instrumentation for MR imaging; fundamentals of the architecture of an MR spectrometer and the gradient subsystem used for image localization; emphasis on the radiofrequency sensors and systems used for signal generation and reception.
Prerequisites: BMEN 420; ECEN 410, or ECEN 411, or approval of instructor; graduate classification.
Cross Listing: ECEN 763/BMEN 627.

BMEN 630 Global Medical Device Regulation
Credits 3.3 Lecture Hours.
Overview of applicable U.S. and international regulations and regulatory processes for the design, approval and marketing of medical devices.
Prerequisite: Approval of instructor.
BMEN 631 Thermodynamics of Biomolecular Systems  
Credits 3. 3 Lecture Hours.  
Introduces equilibrium and non-equilibrium statistical mechanics and applies them to understand various bimolecular systems; including ensemble theory, reaction kinetics, nonlinear dynamics, and stochastic processes; with applied examples such as enzyme-ligand binding kinetics, conformational dynamic of proteins and nucleic acids, population dynamics, and noise in biological signals.  
Prerequisites: BMEN 240, PHYS 208 and MATH 308.

BMEN 632 Molecular and Cellular Biomechanics  
Credits 3. 3 Lecture Hours.  
Introduces biomolecules and their assemblies that play structural and dynamical roles in subcellular to cellular level mechanics, with emphasis on quantitative/theoretical descriptions, and discussions of the relevant experiment approaches to probe these nano to micro-scale phenomena; including topics in (1) self-assembly of cytoskeleton and biomembranes, (2) molecular motors, (3) cell motility, and mechanotransduction.  
Prerequisites: BMEN 240 and MATH 308.

BMEN 635 Biomaterials Compatibility  
Credits 3. 3 Lecture Hours.  
Relevance of mechanical and physical properties to implant selection and design; effect of the body environment on metallic, ceramic and plastic materials; tissue engineering; rejection mechanisms used by the body to maintain homeostasis regulatory requirements.  
Prerequisites: Approval of instructor.

BMEN 640 Design of Medical Devices  
Credits 3. 3 Lecture Hours.  
Overview of the multiple issues in managing the design of a marketable medical device, including the design process from clinical problem definition through prototype and clinical testing to market readiness; includes FDA pre- and post-market regulation, human factors and system safety considerations, and medical product liability.  
Prerequisite: Approval of instructor.

BMEN 641 Numerical Methods in Biomedical Engineering  
Credits 3. 3 Lecture Hours.  
Application of numerical analysis to analyze molecular, cellular and physiological systems; general techniques used to analyze steady and dynamic systems; techniques will be applied in a MATLAB programming environment.  
Prerequisites: BMEN 207, BIOL 213 and VTPP 435; graduate classification or approval of instructor.

BMEN 650 Biomedical Optics Laboratory  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Biomedical optics technology; basic engineering principles used in developing therapeutic and diagnostic devices; a series of hands-on labs will be performed including optical monitoring, diagnostic and therapeutic experiments.  
Prerequisites: MATH 308; PHYS 208.

BMEN 652 Cell Mechanobiology  
Credits 3. 3 Lecture Hours.  
Focuses on how mechanical forces influence cell behavior through physical and biochemical mechanisms; objectives include integrating engineering and cell biology to solve biomedical problems, which includes developing models for applying forces to cultured cells and tissues and measuring changes in cell biochemistry, structure, and function.  
Prerequisites: BMEN 282/CHEN 282.

BMEN 657 Orthopedic Biomechanics  
Credits 3. 3 Lecture Hours.  
Fundamental course in orthopedic biomechanics designed to develop competencies in biomechanical principles using practical examples and clinical case studies of how biomechanical knowledge is applied to the evaluation of musculoskeletal tissues and structures, and treatment options for musculoskeletal dysfunction.  
Prerequisite(s): Admitted into the major degree sequence in Biomedical Engineering and graduate classification. Stacked with BMEN 457.

BMEN 660 Vascular Mechanics  
Credits 3. 3 Lecture Hours.  
Application of continuum mechanics to the study of the heart arteries; on the measurement and quantification of material properties, and the calculation of vascular stresses; analysis of several cardiovascular devices to reinforce the need for careful analysis in the device design.  
Prerequisites: BMEN 240 and BMEN 341 or equivalents.

BMEN 661 Cardiac Mechanics  
Credits 3. 3 Lecture Hours.  
Application of continuum mechanics and computational solid mechanics to the study of the mammalian heart; utilization of continuum mechanics and finite element analysis in solving non-linear boundary value problems in biomechanics.  
Prerequisites: BMEN 240 and BMEN 602; MEMA 467; or equivalents.

BMEN 662 Vascular Fluid Mechanics  
Credits 3. 3 Lecture Hours.  
Bio-fluid mechanics of the human circulatory system including examination of disease development and medical treatments.  
Prerequisites: BMEN 240 or equivalent.

BMEN 663 Soft Tissue Mechanics and Finite Element Methods  
Credits 3. 3 Lecture Hours.  
Application of continuum mechanics and finite element methods to the study of the mechanical behavior or soft tissues and associative applications in biomedicine.  
Prerequisites: BMEN 240 or equivalent.

BMEN 669 Entrepreneurial Issues in Biomedical Engineering Credits 3. 3 Lecture Hours.  
Description and analysis of issues associated with initiating business ventures to transfer biomedical technologies into the health care sector, including intellectual engineering technology area; and utilizing recent case studies of previous ventures.  
Prerequisite: Approval of instructor.

BMEN 672/NUEN 672 Introduction to Diagnostic Radiology Physics Credits 3. 2 Lecture Hours. 3 Lab Hours.  
This course presents the concepts of radiation physics used in diagnostic radiology by providing an introduction to the theory behind the different imaging modalities as it relates to mammography, planar X-ray imaging, computed tomography (CT), single photon emission tomography (SPECT), and positron emission tomography (PET).  
Prerequisite(s): NUEN 611, NUEN 613 or approval from academic advisor.  
Cross Listing: NUEN 672.

BMEN 674 Communications in Biomedical Engineering Credits 3. 3 Lecture Hours.  
General concepts for communicating the results of biomedical research including written papers, conference proceedings, proposals and grants, as well as oral presentations and basic ethics.  
Prerequisite: Approval of instructor.
BMEN 675 Biomedical Case Studies
Credit 1. 1 Lecture Hour.
Introduction to the engineering design process for solving biomedical problems by using the case study method in biomedical instrument design.
Prerequisite: Approval of instructor.

BMEN 680 Biomedical Engineering of Tissues
Credits 3. 3 Lecture Hours.
Introduction to engineering strategies used to repair tissue; literature-grounded overview of current strategies using stem cells, 3D scaffolds and drug/gene delivery including ethical considerations of these therapies.
Prerequisite: BMEN 343 or approval of instructor.

BMEN 681 Seminar
Credit 1. 1 Lecture Hour.
Designed to permit student to broaden capability, performance and perspective in biomedical engineering via his or her own formal presentation and by presentations from other professionals.
Prerequisite: Approval of instructor.

BMEN 682 Polymeric Biomaterials
Credits 3. 3 Lecture Hours.
Preparation, properties, and biomedical applications of polymers including: polymerization; structure-property relationships; molecular weight and measurement; morphology; thermal transitions; network formation; mechanical behavior; polymeric surface modification; polymer biocompatibility and bioadhesion; polymers in medicine, dentistry, and surgery; polymers for drug delivery; polymeric hydrogels; and biodegradable polymers.
Prerequisites: BMEN 342, or approval of instructor.

BMEN 683 Polymeric Biomaterial Synthesis
Credits 3. 3 Lecture Hours.
Overview of polymer synthetic routes and key structure-property relationships with emphasis on the design of polymeric systems to achieve specific properties; tissue engineering and drug delivery applications will be used as model systems to explore the process of biomaterial design from synthesis to device evaluation.
Prerequisites: BMEN 343 or approval of instructor.

BMEN 684 Professional Internship
Credits 1 to 12. 1 to 12 Other Hours.
Training under the supervision of practicing engineers in settings appropriate to the student's professional objectives.
Prerequisites: Approval of chair of student's advisory committee and department head.

BMEN 685 Directed Studies
Credits 1 to 12. 1 to 12 Other Hours.
Allows students the opportunity to undertake and complete, for credit, limited investigations not included within thesis or dissertation research and not covered by other courses. May be repeated for credit.
Prerequisites: Approval of designated instructor and approved project proposal.

BMEN 686 Biomedical Nanotechnology
Credits 3. 3 Lecture Hours.
Introduction to nanotechnology applications in biomedicine; concepts of scale; unique properties at the nanoscale; biological interaction, transport, and biocompatibility of nanomaterials; current research and development of nanotechnology for medical applications, including sensors, diagnostic tools, drug delivery systems, therapeutic devices, and interactions of cells and biomolecules with nanostructured surfaces.
Prerequisites: BMEN 343, approval of instructor.

BMEN 687 Drug Delivery
Credits 3. 3 Lecture Hours.
Mechanisms for controlled release of pharmaceutically active agents and the development of useful drug delivery systems; controlled release mechanisms including diffusive, convective and erosive driving forces by using case studies related to oral, topical and parenteral release in a frontier interdisciplinary scientific research format.
Prerequisite: Graduate classification in biomedical engineering or approval of instructor.

BMEN 689 Special Topics in...
Credits 1 to 4. 0 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of biomedical engineering. May be repeated for credit.
Prerequisite: Approval of instructor.

BMEN 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research for thesis or dissertation.

BOTN - Botany

Courses

BOTN 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of botany. May be repeated for credit.
Prerequisite: Approval of instructor.

BOTN 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Active research of basic nature under the supervision of a Department of Biology faculty member.
Prerequisites: Freshman or sophomore classification and approval of instructor.

BOTN 485 Directed Studies
Credits 3. 3 Lecture Hours.
Problems in various phases of plant, animal and bacteriological science.
Prerequisites: Junior classification; approval of ranking professor in field chosen and Undergraduate Advising Office.

BOTN 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Active research of basic nature under the supervision of a Department of Biology faculty member.
Prerequisites: Junior or senior classification and approval of instructor.

BUSN - Mays Business School

Courses

BUSN 100 The Business Profession
Credit 1. 1 Lecture Hour.
Emphasis on developing professional business competencies; examines business conduct in different business settings; introduction to the necessary knowledge to become a professional through different practice activities. Students may not receive credit for both BUSN 100 and BUSN 101.
Prerequisites: Freshman or sophomore classification; business or general studies major.
BUSB 101 Freshman Business Initiative
Credits 3. 3 Lecture Hours.
Freshman orientation to business and to Mays Business School; introduction to majors within the business school and associated career opportunities; introduction and development of personal and professional competencies, with emphasis on self-leadership, business communication, ethical decision making, and teamwork. Students may not receive credit for both BUSN 101 and BUSN 100.
Prerequisite: Freshman admitted to Mays Business School.

BUSB 125 Business Learning Community I
Credits 3. 3 Lecture Hours.
Focuses on the base competencies that relate to effectively managing people, tasks and organizations, and change and innovation; develops skills in personal and professional competencies, analytical and critical thinking skills, written and oral communication skills, interpersonal skills and problem-solving skills; research emphasis.
Prerequisite: Selection for Mays Business School Honors Program.

BUSB 205 Integrated Worklife Competencies
Credits 3. 3 Lecture Hours.
Application of Mays' core competencies, with required completion of either a peer leadership experience or a team-based service-learning project; continues development of student's electronic portfolio of core competencies. Writing designated.
Prerequisite: Sophomore or higher classification admitted to Mays Business School.

BUSB 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed study of selected problem in business not covered in other courses. May be repeated for credit.
Prerequisites: Freshman or sophomore classification admitted to Mays Business School and approval of instructor.

BUSB 289 Special Topics in...
Credits 1 to 4. 1 to 4 Other Hours.
Selected topics in an identified area of business and public service. May be repeated for credit.
Prerequisite: Freshman or sophomore in business.

BUSB 302 Applied Business Competencies
Credits 1 to 3. 1 to 3 Lecture Hours.
Business core-competencies applied in specific disciplinary and/or experiential contexts; topics include working in the nonprofit sector, office politics; facilitation and training; conflict resolution, women in business, personal leadership, project evaluation. May be taken five times for credit.
Prerequisite: BUSN 205; or approval of instructor.

BUSB 392 Cooperative Education in Business
Credits 2. 40 Other Hours.
Educational work assignment in the field in which the student is interested. Supervision will be by employer with technical report required at semester’s end. Can be taken no more than three times for credit.

BUSB 401 Mays Business Fellows I
Credits 3. 3 Lecture Hours.
A seminar for the development of leadership and management skills.
Prerequisite: Selection for Mays Business Fellows Program.

BUSB 403 Personal Competency Assessment
Credits 3. 3 Lecture Hours.
Self-assessment of development of core business competencies; communication, problem-solving, management and leadership, ethical decision making, team work; compilation and evaluation of evidence of competencies; preparation of competency portfolio; creation of professional development plan.
Prerequisite: BUSN 205; junior or senior classification or approval of instructor.

BUSB 467 Ethics in Business
Credit 1. 1 Lecture Hour.
Integration of ethical reasoning integrity, objectivity and other core values in the development of professionals engaged in business; analyze ethical lapses that have occurred in multiple business disciplines.
Prerequisite: Admission to upper division in Mays Business School.

BUSB 484 Internship
Credits 1 to 3. 1 to 3 Other Hours.
Professional internship or practical experience in a field in which the student is interested, under the direction of the business honors director or a business school faculty member. May be taken two times for credit.
Prerequisite: Business honors major or approval of instructor.

BUSB 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Directed study on selected problems in the area of business administration not covered in other courses. May be repeated for credit.
Prerequisites: Admission to upper division in Mays Business School; approval of instructor.

BUSB 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of business and public service. May be repeated for credit.
Prerequisite: Junior or senior in business.

BUSB 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in Mays Business School. May be repeated 1 times for credit.
Prerequisites: Junior or senior classification admitted to Mays Business School and approval of instructor.

CARC - College of Architecture

Courses

CARC 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of a faculty member. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

CARC 300 College of Architecture Study Abroad
Credits 1 to 18. 1 to 18 Other Hours.
For students in approved study abroad programs participating in reciprocal educational exchange programs. May be repeated for credit.
Prerequisite: Junior or senior classification; approval of assistant dean for international programs and initiatives.
CARC 301 Field Studies in Design Innovation
Credits 1 to 18. 1 to 18 Other Hours.
Design innovation in international and domestic environments away from the Texas A&M University campus; emphasis on the cultural, social, economic, geographical, climatic and technological factors influencing design solutions for human needs. May be taken up to two times in the same semester.
Prerequisite: Junior or senior classification; CARC 481; approval of assistant dean for international programs and initiatives.*

CARC 311 Field Studies in Design Communication
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Design communication in international and domestic environments away from the Texas A&M University campus; emphasis on the tools, methods and techniques for design communication. May be taken up to two times in the same semester.
Prerequisite: Junior or senior classification; approval of assistant dean for international programs and initiatives.*

CARC 321 Field Studies in Design Technology
Credits 3. 3 Other Hours.
Design technology in international and domestic environments away from the Texas A&M University campus; emphasis on structural, material and environmental systems and methods of construction utilized to realize design solutions. May be taken up to two times in the same semester.
Prerequisite: Junior or senior classification; approval of assistant dean for international programs and initiatives.*

CARC 331 Field Studies in Design Philosophy
Credits 3. 3 Other Hours.
Design philosophy in international and domestic environments away from the Texas A&M University campus; emphasis on the historical, philosophical, cultural, social and economic factors that influence design solutions. May be taken up to two times in the same semester.
Prerequisites: Junior or senior classification; approval of assistant dean for international programs and initiatives.*

CARC 481 Seminar
Credit 1. 1 Lecture Hour.
Preparatory seminar for select College of Architecture study away and internships; topics include introduction to the language, culture and history of study abroad location. Must be taken the spring semester before the student’s study away semester. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisites: Junior or senior classification; approval of assistant dean for international programs and initiatives.

CARC 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Individual research in architecture, construction science or landscape architecture in an international or domestic environment away from the Texas A&M University campus. May be taken up to two times in the same semester.
Prerequisite: Junior or senior classification; approval of assistant dean for international programs and initiatives.

CARC 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of architecture. May be repeated for credit.
Prerequisites: Junior or senior classification; approval of assistant dean for international programs and initiatives.

CARC 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of a faculty member. May be repeated 2 times for credit.
Prerequisites: Junior or senior classification; approval of assistant dean for international programs and initiatives.

CARC 600 College of Architecture Graduate Study Abroad
Credits 1 to 16. 1 to 16 Other Hours.
For students in approved study abroad programs participating in reciprocal educational exchange programs.
Prerequisite: Admission to approved program.

CARC 601 Foundations of Research in Planning and Design
Credits 3. 3 Lecture Hours.
Introduction to the research process and its application to problems in planning and design; presentation of philosophy and logic underlying the scientific method; critical analysis of planning and design literature according to each step of the research process: problem definition, hypothesis development, study design, analysis and interpretation of the findings.

CARC 602 Research Methods in Planning and Design
Credits 3. 3 Lecture Hours.
Basic empirical research methods used in planning and design research: experimental, survey and case study designs; comparisons of the various methods; application of techniques in sample selection, data collection and analytic approaches. May be repeated for credit.
Prerequisite: STAT 651 or equivalent.

CARC 604 Advanced Field Studies in Design Innovation
Credits 1 to 18. 1 to 18 Other Hours.
Advanced design innovation in international and domestic environments away from Texas A&M University campus; emphasis on the cultural, social economic, geographical, climatic and technological factors influencing design solutions for human needs.
Prerequisite: Graduate classification.

CARC 685 Directed Studies
Credits 1 to 6. 1-1 Other Hours.
Individual problems involving application of theory and practice in architecture, construction science, landscape architecture and urban and regional planning in an international setting.
Prerequisites: Approval of instructor and department head.

CARC 689 Special Topics in...
Credits 1 to 6. 1 to 6 Lecture Hours.
Selected topics in an identified field. May be repeated for credit.

CARC 698 Writing for Publication
Credits 3. 3 Lecture Hours.
Writing in academic disciplines and settings. Writing for different audiences and purposes. Style: planning and development of academic journal articles; grant proposals; correspondence; oral presentations; technical reports. Permission of departmental/college graduate advisor. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisite: Advanced standing in master’s doctoral programs.

CEHD - Coll of Ed & Human Dev
Courses

CEHD 101 Learning Community Foundations of Leadership
Credit 1. 1 Lecture Hour.
Exploration of leadership identity, and reflection on lessons learned during the first year of college. Must be taken on a satisfactory/unsatisfactory basis.

CEHD 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of education and human development. May be repeated for credit.
Prerequisite: Approval of instructor.

CEHD 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in the College of Education and Human Development. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

CEHD 300 Education and Human Development Study Abroad
Credits 1 to 18. 1 to 18 Lecture Hours.
For students in approved programs to study abroad. May be repeated for credit.
Prerequisites: Approval of department head; junior or senior classification.

CEHD 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in the College of Education and Human Development. May be repeated 2 times for credit.
Prerequisites: Junior or senior classification and approval of instructor.

CEHD 600 Education and Human Development Study Abroad
Credits 1 to 18. 1 to 18 Lecture Hours.
For students in approved programs to study abroad. May be repeated for credit.
Prerequisite: Approval of department head.

CEHD 603 Writing for Publication in Education and Human Development Study Abroad
Credits 1 to 4. 1 to 4 Lecture Hours.
Assists students with writing and submitting research findings for publication, and managing contingencies for becoming productive scholars in their field.
Prerequisite: Graduate classification.

CHEM 101 Fundamentals of Chemistry I
Credit 3. 3 Lecture Hours.
(CHEM 1311, 1411*) Fundamentals of Chemistry I. Introduction to modern theories of atomic structure and chemical bonding; chemical reactions; stoichiometry; states of matter; solutions; equilibrium; acids and bases; coordination chemistry.
Prerequisites: Concurrent enrollment in CHEM 111.

CHEM 102 Fundamentals of Chemistry II
Credits 3. 3 Lecture Hours.
(CHEM 1312, 1412*) Fundamentals of Chemistry II. Theory and applications of oxidation-reductions systems; thermodynamics and kinetics; complex equilibria and solubility product; nuclear chemistry; descriptive inorganic and organic chemistry.
Prerequisites: Concurrent enrollment in CHEM 112.

CHEM 103 Structure and Bonding
Credits 3. 3 Lecture Hours.
Rigorous treatment of chemical principles and their application.
Prerequisite: For entering students with satisfactory scores on math and chemistry placement examinations; concurrent enrollment in CHEM 113.

CHEM 104 Chemistry of the Elements
Credits 3. 3 Lecture Hours.
Continuation of CHEM 103.
Prerequisite: CHEM 103 and CHEM 113; concurrent enrollment in CHEM 114.

CHEM 105 Molecular Science for Citizens
Credits 3. 3 Lecture Hours.
(CHEM 1305, 1405*) Molecular Science for Citizens. Molecules that control daily life explored via a conceptual approach to molecular science; properties, synthesis, transformations and utility of important molecules and fuels, fibers, metals, pharmaceuticals, foods, biomolecules and structural materials; pollution, consumerism, energy production, disease, biotechnology and risk-benefit analysis considered.
Prerequisite: Concurrent enrollment in CHEM 116.

CHEM 106 General Chemistry for Engineering Students
Credits 3. 3 Lecture Hours.
Introduction to important concepts and principles of chemistry; emphasis on areas considered most relevant in an engineering context; practical applications of chemical principles in engineering and technology.
Students completing CHEM 106 and changing majors to curricula requiring CHEM 101 and CHEM 102 may substitute CHEM 106 for CHEM 101. Students may not receive credit for both CHEM 106 and CHEM 101.
Prerequisite: Concurrent enrollment in CHEM 117.

CHEM 107 General Chemistry Laboratory I
Credit 1. 1 Lab Hours.
(CHEM 1111, 1411*) Fundamentals of Chemistry Laboratory I. Introduction to methods and techniques of chemical experimentation; qualitative and semiquantitative procedures applied to investigative situations.
Prerequisite: CHEM 101 or registration therein.

CHEM 108 General Chemistry Laboratory II
Credit 1. 1 Lab Hours.
(CHEM 1112, 1412*) Fundamentals of Chemistry Laboratory II. Introduction to analytical and synthetic methods and to quantitative techniques to both inorganic and organic compounds with emphasis on an investigative approach.
Prerequisites: CHEM 101 and 111 or equivalent; CHEM 102 or registration therein.

Courses - Chemistry

CHEM 100 Horizons in Chemistry
Credit 1. 1 Lecture Hour.
An introduction to chemistry and its relationship to and influence on society; emphasis on chemical demonstrations and the practical application of chemical phenomena. For chemistry majors.
Prerequisite: Major in chemistry or approval of instructor.

CHEM 101 Fundamentals of Chemistry I
Credit 3. 3 Lecture Hours.
(CHEM 1311, 1411*) Fundamentals of Chemistry I. Introduction to modern theories of atomic structure and chemical bonding; chemical reactions; stoichiometry; states of matter; solutions; equilibrium; acids and bases; coordination chemistry.
Prerequisites: Concurrent enrollment in CHEM 111.

CHEM 102 Fundamentals of Chemistry II
Credits 3. 3 Lecture Hours.
(CHEM 1312, 1412*) Fundamentals of Chemistry II. Theory and applications of oxidation-reductions systems; thermodynamics and kinetics; complex equilibria and solubility product; nuclear chemistry; descriptive inorganic and organic chemistry.
Prerequisites: Concurrent enrollment in CHEM 112.

CHEM 103 Structure and Bonding
Credits 3. 3 Lecture Hours.
Rigorous treatment of chemical principles and their application.
Prerequisite: For entering students with satisfactory scores on math and chemistry placement examinations; concurrent enrollment in CHEM 113.

CHEM 104 Chemistry of the Elements
Credits 3. 3 Lecture Hours.
Continuation of CHEM 103.
Prerequisite: CHEM 103 and CHEM 113; concurrent enrollment in CHEM 114.

CHEM 105 Molecular Science for Citizens
Credits 3. 3 Lecture Hours.
(CHEM 1305, 1405*) Molecular Science for Citizens. Molecules that control daily life explored via a conceptual approach to molecular science; properties, synthesis, transformations and utility of important molecules and fuels, fibers, metals, pharmaceuticals, foods, biomolecules and structural materials; pollution, consumerism, energy production, disease, biotechnology and risk-benefit analysis considered.
Prerequisite: Concurrent enrollment in CHEM 116.

CHEM 106 General Chemistry for Engineering Students
Credits 3. 3 Lecture Hours.
Introduction to important concepts and principles of chemistry; emphasis on areas considered most relevant in an engineering context; practical applications of chemical principles in engineering and technology.
Students completing CHEM 106 and changing majors to curricula requiring CHEM 101 and CHEM 102 may substitute CHEM 106 for CHEM 101. Students may not receive credit for both CHEM 106 and CHEM 101.
Prerequisite: Concurrent enrollment in CHEM 117.

CHEM 107 General Chemistry Laboratory I
Credit 1. 1 Lab Hours.
(CHEM 1111, 1411*) Fundamentals of Chemistry Laboratory I. Introduction to methods and techniques of chemical experimentation; qualitative and semiquantitative procedures applied to investigative situations.
Prerequisite: CHEM 101 or registration therein.

CHEM 108 General Chemistry Laboratory II
Credit 1. 1 Lab Hours.
(CHEM 1112, 1412*) Fundamentals of Chemistry Laboratory II. Introduction to analytical and synthetic methods and to quantitative techniques to both inorganic and organic compounds with emphasis on an investigative approach.
Prerequisites: CHEM 101 and 111 or equivalent; CHEM 102 or registration therein.
CHEM 113 Physical and Chemical Principles
Credit 1. 3 Lab Hours.
Elementary experiments in physical chemistry and quantitative analysis.
Prerequisite: CHEM 103 or registration therein.

CHEM 114 Qualitative Analysis
Credit 1. 3 Lab Hours.
Qualitative analysis, elementary inorganic syntheses and quantitative aspects of chemical equilibrium.
Prerequisites: CHEM 104 or registration therein; CHEM 113.

CHEM 116 Molecular Science for Citizens Laboratory
Credit 1. 3 Lab Hours.
(CHEM 1105, 1405*) Molecular Science for Citizens Laboratory. The importance of molecular science to daily life illustrated by using experiments, demonstration and videos; designed to accompany CHEM 106.
Prerequisite: CHEM 106 or registration therein.

CHEM 117 General Chemistry for Engineering Students Laboratory
Credit 1. 3 Lab Hours.
Introduction to important concepts and principles of chemistry in the laboratory; emphasis on areas considered most relevant in an engineering context; practical applications of chemical principles in engineering and technology. Students completing CHEM 117 and changing majors to curricula requiring CHEM 111 and CHEM 112 may substitute CHEM 117 for CHEM 111. Students may not receive credit for both CHEM 117 and CHEM 111.
Prerequisites: CHEM 107 or registration therein.

CHEM 222 Elements of Organic and Biological Chemistry
Credits 3. 3 Lecture Hours.
Organic chemistry and its applications to biological and agricultural chemistry, including chemistry of functional groups, acid-base and redox chemistry, stereochemistry and chemistry of important biological compounds. Not to be used as the basis for further study in organic chemistry or biochemistry.
Prerequisite: CHEM 101 or CHEM 103.

CHEM 227 Organic Chemistry I
Credits 3. 3 Lecture Hours.
(CHEM 2323, 2423*) Organic Chemistry I. Introduction to chemistry of compounds of carbon; general principles and their application to various industrial and biological processes.
Prerequisite: CHEM 102 or CHEM 104. Concurrent registration in CHEM 237 is suggested.

CHEM 228 Organic Chemistry II
Credits 3. 3 Lecture Hours.
(CHEM 2325, 2425*) Organic Chemistry II. Continuation of CHEM 227. Prerequisite: CHEM 227. Concurrent registration in CHEM 238 is suggested.

CHEM 231 Techniques of Organic Chemistry
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Techniques of organic chemistry; preparation, properties of typical organic compounds; separation, purification, analysis, and characterization of organic compounds.
Prerequisites: CHEM 112 or CHEM 114; CHEM 227 or registration therein.

CHEM 234 Organic Synthesis and Analysis IV
Credits 3. 1 Lecture Hour. 6 Lab Hours.
The synthesis of significant types of organic compounds and study of their properties; laboratory separations of mixtures of organic substances, identification of compounds by functional group tests and preparation of derivatives; instrumental methods of separation, identification and analysis.
Prerequisites: CHEM 228 or registration therein; CHEM 231 or CHEM 237.

CHEM 237 Organic Chemistry Laboratory
Credit 1. 3 Lab Hours.
(CHEM 2123, 2223, 2423*) Organic Chemistry Laboratory. Operations and techniques of elementary organic chemistry laboratory; preparation, reactions and properties of representative organic compounds.
Prerequisites: CHEM 102, CHEM 104 or CHEM 112, CHEM 114; CHEM 227 or registration therein.

CHEM 238 Organic Chemistry Laboratory
Credit 1. 3 Lab Hours.
(CHEM 2125, 2225, 2425*) Organic Chemistry Laboratory. Continuation of CHEM 237.
Prerequisites: CHEM 228 or registration therein; CHEM 237 or CHEM 231.

CHEM 242 Elementary Organic Chemistry Laboratory
Credit 1. 3 Lab Hours.
Operations and techniques of elementary organic chemistry laboratory with emphasis on experiments for students of agriculture.
Prerequisite: CHEM 222 or registration therein.

CHEM 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Introduction to research, library and laboratory work designed for the freshman or sophomore students.
Prerequisite: Approval of department head.

CHEM 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of chemistry. May be repeated for credit.
Prerequisite: Approval of instructor.

CHEM 291 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in chemistry. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

CHEM 315 Quantitative Analysis
Credits 3. 3 Lecture Hours.
Introduction to quantitative methods of analysis; solution chemistry; chemical equilibrium of analytically useful reactions and of processes important in advanced analytical methods including electrochemistry, separations and kinetic methods.
Prerequisite: CHEM 102 or CHEM 104.

CHEM 316 Quantitative Analysis
Credits 2. 2 Lecture Hours.
Methods of chemical analysis; chemical equilibrium; basic chemical instrumentation.
Prerequisite: CHEM 102 or CHEM 104.
CHEM 317 Quantitative Analysis
Credits 2. 2 Lecture Hours.
Introduction to the fundamental principles and applications of modern instrumental techniques of quantitative analysis, with emphasis on spectroscopic and chromatographic methods.
Prerequisite: CHEM 316.

CHEM 318 Quantitative Analysis Laboratory
Credit 1. 3 Lab Hours.
Laboratory work consists of selected experiments in quantitative analysis designed to typify operations of general analytical lab, including chemical analyses by volumetric and gravimetric methods; introduction to chemical measurements by spectroscopic and separations techniques and associated instrumentation.
Prerequisites: CHEM 112 or CHEM 114; CHEM 315 or CHEM 316 or registration therein.

CHEM 320 Instrumental Analysis Laboratory
Credits 2. 6 Lab Hours.
Experimental studies using modern spectroscopic, chromatographic and electroanalytical methods.
Prerequisites: CHEM 317 or registration therein; CHEM 318.

CHEM 322 Physical Chemistry for Engineers
Credits 3. 3 Lecture Hours.
Quantum theory, spectroscopy, statistical mechanics, kinetic theory, reaction kinetics, electrochemistry and macromolecules.
Prerequisites: CHEM 102 or CHEM 104; CHEN 205 and CHEN 354; MATH 152 or equivalent.

CHEM 325 Physical Chemistry Laboratory I
Credit 1. 3 Lab Hours.
Quantitative experiments involving physical chemistry principles in areas such as thermodynamics, electrochemistry, molecular structure and equilibria using modern instrumentation.
Prerequisite: CHEM 327 or registration therein.

CHEM 326 Physical Chemistry Laboratory II
Credit 1. 3 Lab Hours.
Quantitative experiments involving physical chemistry principles in such areas as kinetics, properties of gases, phase equilibria and macromolecules using modern instrumentation.
Prerequisite: CHEM 328 or registration therein.

CHEM 327 Physical Chemistry I
Credits 3. 3 Lecture Hours.
Introduction to quantum mechanics, exactly solvable model problems; many electron systems and approximate methods; chemical bonding and the electronic structure of molecules; rotational, vibrational, and electronic spectroscopy; molecular symmetry.
Prerequisite: MATH 152 or MATH 172; MATH 221; MATH 251 or MATH 253 encouraged; PHYS 208; PHYS 218. Replaces CHEM 324 in previous catalogs.

CHEM 328 Physical Chemistry II
Credits 3. 3 Lecture Hours.
A rigorous treatment of first, second, and third laws of thermodynamics; applications to gases (both ideal and real), liquids, solutions and phase equilibria; statistical thermodynamics; kinetic theory of gases; introduction to chemical kinetics.
Prerequisite: CHEM 327. Replaces CHEM 323 in previous catalogs.

CHEM 362 Descriptive Inorganic Chemistry
Credits 3. 3 Lecture Hours.
Introduction to inorganic chemistry with a focus in descriptive inorganic chemistry, bonding theories in inorganic molecules and in the solid state, redox chemistry, descriptive main group and transition metal chemistry; ligand field theory, molecular magnetism and electronic spectra in transition metal complexes.
Prerequisites: CHEM 102, CHEM 104 or equivalent.

CHEM 383 Chemistry of Environmental Pollution
Credits 3. 3 Lecture Hours.
Chemical pollutants in the air, in water and on land: their generation, chemical reactivity, action on environment and disappearance through chemical mechanisms; chemistry of existing pollution abatement.
Prerequisites: CHEM 102 or CHEM 104; junior or senior classification.

CHEM 415 Analytical Chemistry
Credits 3. 3 Lecture Hours.
Theory and practical aspects of modern instrumental methods of quantitative analysis; instrumental approaches to selectivity and sensitivity; examples of major, minor and trace component analysis.
Prerequisite: CHEM 315.

CHEM 433 Advanced Inorganic Chemistry Laboratory
Credits 2. 6 Lab Hours.
Preparation, characterization and properties of bioinorganic, organometallic and macromolecular inorganic compounds; special techniques (glove box manipulations and double-manifold Schlenk lines) for handling air-sensitive materials.
Prerequisite: CHEM 362 or registration therein.

CHEM 434 Analytical Instrumentation Laboratory
Credits 2. 6 Lab Hours.
Practical application of modern instrumental methods of quantitative analysis; atomic and molecular techniques to conduct chemical characterizations and analyses.
Prerequisite: CHEM 415 or registration therein.

CHEM 446 Organic Chemistry III
Credits 3. 3 Lecture Hours.
Principles and applications for students in chemistry, chemical engineering and biological and physical sciences; bonding, chemical reactivity, stereochemistry and synthesis.
Prerequisites: CHEM 228 and CHEM 328 or concurrent enrollment in CHEM 328.

CHEM 447 QUAL ORGANIC ANAL
Credits 3. 1 Lecture Hour. 6 Lab Hours.

CHEM 456 Chemical Biology
Credits 3. 3 Lecture Hours.
Application of chemical principles to biological phenomena; capstone course for advanced students, integrating organic or inorganic chemistry with biology.
Prerequisites: CHEM 228 or equivalent; junior or senior classification.

CHEM 462 Inorganic Chemistry
Credits 3. 3 Lecture Hours.
Periodic relationship of elements, their compounds, principles of their bonding and applications.
Prerequisites: CHEM 328 and CHEM 362.
CHEM 464 Nuclear Chemistry  
**Credits 3.3 Lecture Hours.**  
Properties of the nucleus; radioactivity; decay kinetics; nuclear masses; theory of radioactive decay; nuclear reactions; radiochemistry; nuclear energy; hands-on demonstrations; applications to non-nuclear problems.  
**Prerequisites:** CHEM 322 or CHEM 327; CHEM 315 or CHEM 316 recommended.

CHEM 466 Polymer Chemistry  
**Credits 3.3 Lecture Hours.**  
Mechanisms of polymerization reactions of monomers and molecular weight distributions of products; principles, limitations and advantages of most important methods of molecular weight determination; relationship of physical properties to structure and composition: correlations of applications with chemical constitution.  
**Prerequisites:** CHEM 228 and CHEM 315 or equivalents.

CHEM 470 Industrial Chemistry  
**Credits 3.3 Lecture Hours.**  
Applications of organic and inorganic chemical reactions in the manufacture of commercial products; chemistry of petroleum refining and petrochemical processing; industrial polymerization processes; commodity and fine chemical production; influence of kinetics and thermodynamics on economics of industrial chemical production; pollution abatement technology.  
**Prerequisites:** CHEM 228; junior or senior classification.

CHEM 481 Seminar  
**Credits 2.2 Lecture Hours.**  
Preparation of oral and written reports on selected topics from recent technical publications.

CHEM 483 Green Chemistry  
**Credits 3.3 Lecture Hours.**  
Environmentally benign chemistry; the design of chemical products and processes that reduce or eliminate the use and generation of hazardous substances; twelve principles of Green Chemistry; atom economy; use of renewable resources; catalysis for Green Chemistry; alternative solvents and reaction media; energy and the environment.  
**Prerequisites:** CHEM 228; CHEM 362 recommended; junior or senior classification.

CHEM 485 Directed Studies  
**Credits 1 to 16. 1 to 16 Other Hours.**  
Introduction to research, library and laboratory work.  
**Prerequisites:** Senior classification and approval of chemistry advisor.

CHEM 489 Special Topics in...  
**Credits 1 to 4. 1 to 4 Lecture Hours.**  
Selected topics in an identified area of chemistry. May be repeated for credit.

CHEM 491 Research  
**Credits 0 to 10. 0 to 10 Other Hours.**  
Active research of basic nature under the supervision of Department of Chemistry faculty member. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.  
**Prerequisites:** Chemistry major; junior classification or approval of chemistry advisor.

CHEM 601 Analytical Chemistry I  
**Credits 3.3 Lecture Hours.**  
Fundamentals of chemical instrumentation. Modular approach to instrumental methods of chemical analysis; modules to be covered include digital electronics, modern optics, basic quantification and signal-to-noise enhancements.  
**Prerequisite:** Graduate classification in chemistry or approval of instructor.

CHEM 602 Analytical Chemistry II  
**Credits 3.3 Lecture Hours.**  
Modern analytical techniques, spectrosopies, chromatography, and "hyphenated" methods such as GC-FTIR, GC-MS, HPLC-MS, CE-LIF, and CE-MS are examined from the perspective of surface analysis, fundamentals of separation science and structural characterization of complex molecular systems.  
**Prerequisite:** CHEM 601.

CHEM 603 Modern Chromatographic Separation Methods  
**Credits 3.3 Lecture Hours.**  
Intended for graduate students in chemistry, chemical engineering, and the life sciences.  
**Prerequisite:** Graduate standing.

CHEM 610 Organic Reactions  
**Credits 3.3 Lecture Hours.**  
Introduction to mechanisms and scope of the basic organic reaction types as applied to major functional groups.  
**Prerequisite:** CHEM 646 or approval of instructor.

CHEM 615 Organic Synthesis  
**Credits 3.3 Lecture Hours.**  
Application of organic reactions to synthesis of complex organic molecules. Synthesis design and methodology, scope and limitations of reactions and experimental design.  
**Prerequisite:** CHEM 610.

CHEM 616 Organometallic Transformations for Organic Synthesis  
**Credits 3.3 Lecture Hours.**  
Introduction to transition and main group metal-mediated reactions in organic synthesis; organometallic mechanisms in the context of homogeneous catalytic systems currently employed in synthetic laboratories; emphasis on the properties of transition metal complexes and their interactions with organic substrates that promote useful chemical transformations.  
**Prerequisite:** CHEM 646 recommended.

CHEM 618 NMR Spectroscopy  
**Credits 3.3 Lecture Hours.**  
Theory and practice of modern nuclear magnetic resonance spectroscopy; Bloch equations, relaxation and relaxation mechanisms, chemical exchange, pulse and Fourier-transform methods, selective excitation, 2-D methods and solid-state nuclear magnetic resonance.  
**Prerequisite:** Graduate classification in chemistry or approval of instructor.

CHEM 619 Analytical Spectroscopy  
**Credits 3.3 Lecture Hours.**  
Modern analytical spectroscopic techniques; U.V., visible spectroscopy, atomic absorption, emission spectrometry, flame emission, fluorometry, x-ray methods and other new developments in analytical spectroscopy.  
**Prerequisite:** CHEM 602 or approval of instructor.
CHEM 621 Chemical Kinetics
Credits 3.3 Lecture Hours.
Present theories about chemical reaction rates and mechanisms.
Prerequisite: CHEM 328 or approval of instructor.

CHEM 623 Surface Chemistry
Credits 3.3 Lecture Hours.
Nature, structure and chemistry of surfaces; characterization of surfaces from surface energy to structure; relation to chemical processes.
Prerequisite: Graduate classification in chemistry or approval of instructor.

CHEM 627 Principles of Biological Chemistry
Credits 3.3 Lecture Hours.
General principles of biological chemistry with an emphasis on the structures and mechanisms of action for proteins, nucleic acids and lipids.
Prerequisite: Graduate classification.

CHEM 628 Coordination and Bioinorganic Chemistry
Credits 3.3 Lecture Hours.
Structure and reactivity of coordination compounds; reactions of metal ions with small biomolecules and the reactions of toxic metal ions; role of metal ions in biological systems including the function of metal ions in enzymes.
Prerequisite: CHEM 633.

CHEM 629 Main Group Chemistry
Credits 3.3 Lecture Hours.
Chemistry of the ns and np elements of the periodic table and the noble gases including the organometallic chemistry of these elements.
Prerequisite: CHEM 633.

CHEM 630 Bioorganic Chemistry
Credits 3.3 Lecture Hours.
Biorganic Chemistry. Introduction to current research areas of bioorganic chemistry and chemical genetic tools in exploring biological systems; DNA recombinant technology; histone chemical biology; protein glycosylation; protein engineering methods; gene transcription regulation; semi-synthesis of proteins with PTM analogs.
Prerequisites: CHEM 627 or approval of instructor.

CHEM 631 Statistical Thermodynamics
Credits 3.3 Lecture Hours.
Methods of statistical mechanics based primarily on Boltzmann statistics; approach to thermodynamics through partition function; statistical concept of entropy.

CHEM 633 Principles of Inorganic Chemistry
Credits 3.3 Lecture Hours.
General principles of inorganic chemistry treated with a view to applications in other subfields of chemistry.
Prerequisite: Graduate classification in chemistry or approval of instructor.

CHEM 634 Physical Methods in Inorganic Chemistry
Credits 3.3 Lecture Hours.
Determination of the molecular structure of inorganic and organometallic species; modern aspects of diffraction, magnetic resonance and vibrational methods.
Prerequisite: CHEM 641 or CHEM 673.

CHEM 635 Introduction to X-ray Diffraction Methods
Credits 3.3 Lecture Hours.
Fundamentals of diffraction theory by crystals and the solution of crystal structures using this methodology.
Prerequisite: BS in Chemistry, Physics, or Engineering.

CHEM 636 Mechanistic Inorganic Chemistry
Credits 3.3 Lecture Hours.
Reaction pathways in both main group and transition-metal complexes; factors which influence the reaction rate including nature of the metal, the coordination sphere, reaction conditions and catalytic intermediates.
Prerequisite: CHEM 633.

CHEM 640 Laboratory Methods in Biological Chemistry
Credits 3.1 Lecture Hour. 6 Lab Hours.
Application of chemical techniques to the investigation and/or manipulation of biological systems; laboratory methods provides a hands-on opportunity to gain an understanding and appreciation for chemical biology techniques.
Prerequisite: Graduate classification or approval of instructor.

CHEM 641 Structural Inorganic Chemistry
Credits 3.3 Lecture Hours.
Introduction to chemical bonding; ionic, covalent, coordinate and hydrogen bonding; relationship of molecular orbital and ligand field theories to experimental studies of the electronic structure of inorganic molecules.
Prerequisites: CHEM 633 and CHEM 673.

CHEM 642 Organometallic Chemistry and Homogeneous Catalysis
Credits 3.3 Lecture Hours.
Synthesis, structure and reactivity of organometallic compounds; elementary processes for general and radical reactions, mechanism of reactions at metal centers and applications to homogeneous catalysis.
Prerequisite: CHEM 633.

CHEM 644 Natural Products Biosynthesis
Credits 3.3 Lecture Hours.
Survey of the chemical reactions occurring in living systems, describe the experimental methods used to study these reactions and examine the biosynthesis of the major families of natural products; emphasis on the mechanistic chemistry of the biosynthetic pathway.
Prerequisite: Graduate classification or approval of instructor.

CHEM 646 Physical Organic Chemistry
Credits 3.3 Lecture Hours.
A detailed introduction to the theory and principles of organic chemistry; bonding and structure in organic chemistry, stereochemistry, reactive intermediates in organic chemistry and transition state theory; kinetics and thermodynamic approaches.
Prerequisite: CHEM 228 or approval of instructor.

CHEM 647 Spectra of Organic Compounds
Credits 3.3 Lecture Hours.
Correlations of molecular structure with spectroscopic and other physical properties; applications to modern problems in organic chemistry.
Prerequisite: CHEM 646 or approval of instructor.

CHEM 648 Principles of Quantum Mechanics
Credits 3.3 Lecture Hours.
Classical mechanics and development of wave mechanics; application of wave mechanics to special chemical problems.
Prerequisite: Approval of instructor.

CHEM 658 Molecular Modeling
Credits 2.1 Lecture Hour. 3 Lab Hours.
An introduction to molecular modeling with an emphasis on quantum level calculations. Lectures will cover the basic theory behind the calculations and lab work will focus on the practical application of modern computational chemistry codes.
Prerequisite: Graduate classification or approval of instructor.
CHEM 660 Nuclear Chemistry  
Credits 3. 3 Lecture Hours. 0 Lab Hours.  
Radioactive decay, nuclear models, nuclear spectroscopy, nuclear reactions, fission and other topics of current interest in nuclear chemical research.  
Prerequisite: CHEM 464 or approval of instructor.

CHEM 670 Physical Methods in Biological Chemistry  
Credits 3. 3 Lecture Hours.  
Overview of current methods for the characterization of biological macromolecules, including protein structure, protein-ligand interactions, protein folding; techniques discussed include nuclear magnetic resonance, optical spectroscopy, calorimetry, electron paramagnetic resonance, Mössbauer spectroscopy, X-ray crystallography, electron microscopy, and mass spectrometry.  
Prerequisite: Graduate classification or approval of instructor.

CHEM 672 Bioorganic Reaction Mechanisms  
Credits 3. 3 Lecture Hours.  
Proposed mechanisms of action of various enzymes and coenzymes from the “model systems” approach; new developments, theory and established mechanisms.  
Prerequisites: CHEM 646; BICH 624.

CHEM 673 Symmetry and Group Theory in Chemistry  
Credits 3. 3 Lecture Hours.  
Applications of symmetry and group theory to various types of chemical systems; classification of molecules into symmetry point groups and use of character tables.  
Prerequisite: Bachelor's degree in chemistry.

CHEM 681 Seminar  
Credit 1. 1 Lecture Hour.  
Oral presentations and discussions of recent advances in chemistry.

CHEM 684 Professional Internship  
Credits 1 to 4. 1 to 4 Other Hours.  
Supervised practical experience in professional functions appropriate to career goals in chemical education. Students will be required to complete a scholarly report of these activities acceptable to graduate committee. Enrollment limited to students pursuing a non-thesis MS degree, with emphasis on chemical education. Requires approval of committee chair and department head with non-thesis MS degree plan filed.  
Prerequisite: Graduate classification in chemistry.

CHEM 685 Directed Studies  
Credits 1 to 6. 1 to 6 Other Hours.  
Special topics to suit small group requirements; more recent problems and results in various branches of chemistry; laboratory work or conference and discussion.  
Prerequisite: Graduate classification.

CHEM 686 Ethics in Chemical Research and Scholarship  
Credit 1. 1 Lecture Hour.  
Ethical issues in chemical research and scholarship and methods for resolution of such issues; includes Texas A&M University Policies and Procedures, ethics and scientific truth, ethics and other scientists and ethics and society; case studies.  
Prerequisite: Graduate classification in chemistry or biochemistry.

CHEM 689 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 8 Lab Hours.  
Selected topics in an identified area of chemical engineering for lower division students. May be repeated for credit.  
Prerequisites: Graduate classification and approval of instructor.

CHEM 690 Theory of Chemical Research  
Credits 3. 3 Lecture Hours.  
The design of research experiments in various subfields of chemistry and the evaluation of research results with the aid of examples taken from the current scientific literature. May be repeated for credit.

CHEM 691 Research  
Credits 1 to 23. 1 to 23 Other Hours.  
Research for thesis or dissertation.

CHEM 695 Frontiers in Chemical Research  
Credits 3. 3 Lecture Hours.  
Present status of research in a variety of significant chemical fields. Content will depend on the availability of visiting lecturers who will be selected because of distinguished international recognition in their fields of research. May be taken twice.  
Prerequisite: Graduate classification.

CHEM 697 Methods in Teaching Chemistry Laboratory  
Credit 1. 1 Lecture Hour. 1 Lab Hour.  
An introduction to teaching methods associated with the teaching of introductory chemistry laboratories using graduate teaching assistants. Emphasis placed on effective communication, preparation, record keeping, and safe and effective management of an instructional laboratory. May be repeated for credit.  
Prerequisite: Graduate classification in chemistry.

**CHEN - Chemical Engineering**

### Courses

**CHEN 204 Elementary Chemical Engineering**  
Credits 3. 3 Lecture Hours. 0 Lab Hours.  
Solution of elementary problems by application of mass balances, energy balances and equilibrium relationships.  
Prerequisite: Admission to chemical engineering major or approval of instructor.

**CHEN 205 Chemical Engineering Thermodynamics I**  
Credits 3. 3 Lecture Hours.  
First and second laws of thermodynamics; volumetric properties of pure fluids; heat effects; applications to flow processes, power cycles, refrigeration.  
Prerequisites: CHEN 204.

**CHEN 285 Directed Studies**  
Credits 1 to 4. 1 to 4 Other Hours.  
Directed study of special projects or studies in chemical engineering processes or operations, for lower division students.  
Prerequisites: Freshman or sophomore classification; approval of department head.

**CHEN 289 Special Topics in...**  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of chemical engineering for lower division students. May be repeated for credit.  
Prerequisite: Approval of instructor.
CHEN 301 Engineering Workplace Writing
Credits 3. 3 Lecture Hours.
Processes for preparing documents commonly developed by engineers in the workplace; database research; electronic collaboration; ethics, planning, drafting, revising, and editing reports, proposals, correspondence, instructions, procedures, and presentations for the engineering workplace; meets ABET communication requirements.
Prerequisites: ENGL 104 or equivalent; junior or senior classification in chemical engineering or approval by CHEN.

CHEN 304 Chemical Engineering Fluid Operations
Credits 3. 3 Lecture Hours.
Fundamentals of fluid mechanics with applications to design and analysis of process equipment.
Prerequisites: CHEN 205; MATH 308.

CHEN 313 Chemical Engineering Materials
Credits 3. 3 Lecture Hours.
Overview of materials science with particular emphasis on classes of materials relevant to chemical engineers.
Prerequisite: CHEN 204, MATH 251 or registration therein, CHEN 205 or registration therein; or approval of instructor.

CHEN 320 Numerical Analysis for Chemical Engineers
Credits 3. 3 Lecture Hours.
Applications of numerical analysis techniques to mathematical models of processes common to chemical and associated industries; computational methods and software for analysis of chemical engineering processes.
Prerequisites: CHEN 205, MATH 308 or approval of instructor.

CHEN 323 Chemical Engineering Heat Transfer Operations
Credits 3. 3 Lecture Hours.
Heat transfer operations.
Prerequisite: CHEN 304.

CHEN 354 Chemical Engineering Thermodynamics II
Credits 3. 3 Lecture Hours.
Applications of thermodynamics to pure and mixed fluids; phase equilibria and chemical reaction equilibria.
Prerequisites: CHEN 205; CHEN 320 or registration therein; MATH 308; or approval of instructor.

CHEN 382 Bioprocess Engineering
Credits 3. 3 Lecture Hours.
Application of engineering principles to design of biocatalysts and bioprocesses.
Prerequisite: Grade of C or better in CHEN 204 and CHEN 205; junior or senior classification.

CHEN 409 Mathematical Models of Chemical Processes
Credits 3. 3 Lecture Hours.
Development of the mathematical models of chemical and physical processes common to the petroleum processing, chemical and associated industries.
Prerequisite: CHEN 424.

CHEN 414 Chemical Engineering Laboratory I
Credit 1. 3 Lab Hours.
Laboratory work based on CHEN 304 and CHEN 323.
Prerequisites: CHEN 304; CHEN 323 or registration therein with approval of instructor; CHEN 301 or ENGL 210.

CHEN 422/BAEN 422 Unit Operations in Food Processing
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Design of food process engineering systems; basic concepts of rheology and physical properties of foods; fundamentals of heat and mass transfer and process control.
Prerequisites: CHEN 205 and CHEN 304, or ENGR 214.
Cross Listing: BAEN 422/CHEN 422.

CHEN 424 Chemical Engineering Mass Transfer Operations
Credits 3. 3 Lecture Hours.
Introduction to mass transfer operations with applications to design and analysis of process equipment.
Prerequisites: CHEN 323 or registration therein; CHEN 354; or approval of instructor.

CHEN 425 Process Integration, Simulation and Economics
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Integration, simulation, and economic methods involved in the design of chemical processes and equipment.
Prerequisite: CHEN 320, CHEN 323 or registration therein; CHEN 354.

CHEN 426 Chemical Engineering Plant Design
Credits 3. 1 Lecture Hour. 6 Lab Hours.
Integration of material from other chemical engineering courses with applications to the design of plants and processes representative of the chemical and related process industries.
Prerequisites: CHEN 424 and CHEN 425; graduating senior or approval of instructor.

CHEN 430/SENG 430 Risk Analysis in Safety Engineering
Credits 3. 3 Lecture Hours.
Concepts of risk and risk assessment, which uses all available information to provide a foundation for risk-informed and cost-effective engineering practices; examples and exercises are drawn from a variety of engineering areas.
Prerequisite: Junior or senior classification.
Cross Listing: SENG 430/CHEN 430.

CHEN 433 Chemical Engineering Laboratory II
Credit 1. 3 Lab Hours.
Laboratory work based on CHEN 424, CHEN 461 and CHEN 464.
Prerequisites: CHEN 414 and CHEN 424; CHEN 464 or registration therein.

CHEN 440 Introduction to Transport Phenomena
Credits 3. 3 Lecture Hours.
Unifying principles and analytical description of phenomena of momentum transport (viscous flow), energy transport (heat conduction and convection) and mass transport (diffusion) in continuous media; similarities and differences in these phenomena.
Prerequisite: Senior classification or approval of instructor.

CHEN 450 Microfabrication and Microfluidics Technology
Credits 3. 3 Lecture Hours.
Micro Electro Mechanical Systems (MEMS) technology; study the fundamentals of fluids, heat and mass transfer, surface chemistry, and electrochemical interactions.
Prerequisite: Junior or senior classification.

CHEN 451 Introduction to Polymer Engineering
Credits 3. 3 Lecture Hours.
Fundamentals of polymer reaction kinetics, morphology, chemical and rheological properties with applications to polymer synthesis, production and processing operations.
Prerequisite: Senior classification in chemical engineering or approval of instructor.
CHEN 455/SENG 455 Process Safety Engineering  
**Credits 3.3 Lecture Hours.**  
Applications of engineering principles to process safety and hazards analysis, mitigation, and prevention, with special emphasis on the chemical process industries; includes source modeling for leakage rates, dispersion, analysis, relief valve sizing, fire and explosion damage analysis, hazards identification, risk analysis, accident investigations.  
**Prerequisite:** Senior classification in any engineering major.  
**Cross Listing:** SENG 455/CHEN 455.

CHEN 458 Fundamentals of Environmental Remediation Processes  
**Credits 3.3 Lecture Hours.**  
Fundamental approach to various remediation technologies; topics in environmental thermodynamics and mass transfer; adsorption, desorption, ion exchange, air stripping extractions, chemical oxidation, biodegradation.  
**Prerequisites:** CHEN 354 and CHEN 424.

CHEN 459 Gas and Petroleum Processing  
**Credits 3.3 Lecture Hours.**  
Design and operation of petroleum and gas processing facilities including gas hydrate suppression, dehydration, sweetening, sulfur recovery, LPG and liquid recovery, refining operations; analysis of the design and operations involving a large degree of process simulation.  
**Prerequisites:** CHEN 323 and approval of instructor.

CHEN 460/SENG 460 Quantitative Risk Analysis in Safety Engineering  
**Credits 3.3 Lecture Hours.**  
Fundamental concepts, techniques, and applications of risk analysis and risk-informed decision making for engineering students; practical uses of probabilistic methods are demonstrated in exercises and case studies from diverse engineering areas.  
**Prerequisite:** Senior or graduate classification.  
**Cross Listing:** SENG 460/CHEN 460.

CHEN 461 Process Dynamics and Control  
**Credits 3.3 Lecture Hours.**  
Analysis of process dynamics and methods for the design of automatic control systems for chemical process plants.  
**Prerequisite:** CHEN 320.

CHEN 463 Systems Biology  
**Credits 3.3 Lecture Hours.**  
Experimental and computational techniques in systems biology; includes high throughput experiments, data analysis, modeling and simulation; discussed in the context to specific applications such as signal transduction.  
**Prerequisite:** CHEN 382 or approval of instructor.

CHEN 464 Kinetics and Reactor Design  
**Credits 3.3 Lecture Hours.**  
Introduction to kinetics of reactions and application of fundamental principles to design and operation of commercial reactors.  
**Prerequisites:** CHEN 320, CHEN 323, CHEN 354 or approval of instructor.

CHEN 469 Chemical Engineering Car Design  
**Credit 1.1 Lecture Hour.**  
Application of chemical, physical and engineering principles in design process, idea generation and development of design concepts, economic, safety and performance analysis. May be taken four times for credit.  
**Prerequisites:** CHEN 204, CHEN 205; junior or senior classification or approval of instructor.

CHEN 470/BMEN 470 Introduction of Biomedical Optics  
**Credits 3.3 Lecture Hours.**  
Fundamentals of biomedical optics; basic engineering principles used in optical therapeutics, optical diagnostics and optical biosensing.  
**Prerequisites:** MATH 308; PHYS 208.  
**Cross Listing:** BMEN 470/CHEN 470.

CHEN 471/BAEN 471 Bioreactor Engineering  
**Credits 3.3 Lecture Hours.**  
Fundamentals of microbial and enzyme kinetics; basic biochemical reaction theory and reactor systems; heterogeneous reactions and transport considerations in enzyme and cell reactors, and immobilized systems; bioreactor design considerations in bioprocessing.  
**Prerequisites:** CHEN 282 or CHEN 382 or BAEN 302; junior or senior classification in engineering or approval of instructor.  
**Cross Listing:** BAEN 471/CHEN 471.

CHEN 475 Microelectronics Process Engineering  
**Credits 3.3 Lecture Hours.**  
State-of-the-art process engineering principles on microelectronics, especially for the fabrication of very large scale integrated circuits (VLSICs); fundamental unit processes, such as thin film deposition, thermal growth, lithography, etching and doping, material structures and properties, and basic device operation principles.  
**Prerequisites:** CHEN 354 and CHEN 464 or approval of instructor; CHEN 322.

CHEN 481 Seminar  
**Credit 1.2 Lab Hours.**  
Preparation of oral and written reports on selected topics from recent technical publications.  
**Prerequisites:** Senior classification in chemical engineering, ENGL 210 or ENGL 301.

CHEN 485 Directed Studies  
**Credits 1 to 5.5 Other Hours.**  
Work covers one or more problems in chemical engineering processes or operations.  
**Prerequisite:** Approval of department head.

CHEN 489 Special Topics in...  
**Credits 1 to 4.1 to 4 Lecture Hours.**  
Selected topics in an identified area of chemical engineering. May be repeated for credit.  
**Prerequisite:** Senior classification in chemical engineering or approval of instructor.

CHEN 491 Research  
**Credits 1 to 4.1 to 4 Other Hours.**  
Research conducted under the direction of faculty member in chemical engineering. May be repeated 2 times for credit.  
**Prerequisites:** Junior or Senior classification and approval of instructor.

CHEN 601 Chemical Engineering Laboratory Safety and Health  
**Credit 1.1 Lecture Hour.**  
Control of hazards associated with chemical engineering research laboratories and the chemical process industry; causes and prevention of accidents, emergency procedures, safety codes, health effects of toxic substances and experimental design for safety.  
**Prerequisite:** Graduate classification.
Course Descriptions

CHEN 604 Chemical Engineering Process Analysis I
Credits 3.3 Lecture Hours.
Development and analysis of chemical process models that involve systems of algebraic equations, ordinary differential equations and partial differential equations.
Prerequisite: MATH 308 or approval of instructor.

CHEN 605 Chemical Engineering Process Analysis II
Credits 3.3 Lecture Hours.
Formulation of mathematical models and solution of resulting mass and energy balance equations by modern computational techniques, applications to separation processes, chemical kinetics, reaction engineering, heat and mass transfer.
Prerequisite: CHEN 320 or approval of instructor.

CHEN 614 Advanced Transport Phenomena I
Credits 4.4 Lecture Hours.
First part of a two-semester sequence covering advanced transport phenomena; emphasis is placed on momentum transfer or fluid mechanics applied to chemical engineering problems.
Prerequisite: Approval of instructor.

CHEN 615 Advanced Transport Phenomena II
Credits 3.3 Lecture Hours.
Advanced energy and mass transfer in chemical engineering processes.
Prerequisite: Approval of instructor.

CHEN 623 Applications of Thermodynamics to Chemical Engineering
Credits 3.3 Lecture Hours.
Application of thermodynamics to chemical engineering operations and processes.
Prerequisite: CHEN 354 or approval of instructor.

CHEN 624 Chemical Engineering Kinetics and Reactor Design
Credits 3.3 Lecture Hours.
Rates and mechanisms of chemical reactions. Thermal and catalytic reactions both homogeneous and heterogeneous.
Prerequisite: CHEN 464 or approval of instructor.

CHEN 629 Transport Phenomena
Credits 3.3 Lecture Hours.
Principles of transfer of momentum, energy and mass studied by application to advanced chemical engineering problems. Theoretical analogy of these three modes of transfer.
Prerequisite: CHEN 424 or approval of instructor.

CHEN 631 Process Dynamics and Advanced Process Control
Credits 3.3 Lecture Hours.
Modeling, analysis, and simulation of linear and nonlinear process systems; model-based control techniques for achieving desired process dynamics.
Prerequisite: CHEN 461 or approval of instructor.

CHEN 633 Thermodynamics and Kinetics of Confined Fluids
Credits 3.3 Lecture Hours.
Emphasis on fluids, adsorption phenomena (theory and applications), phase transitions in confined fluids (capillary condensation and freezing), the behavior of confined water, reactions in confinement, and applications.
Prerequisite: CHEN 623 or approval of instructor.

CHEN 634 Catalysis and Multiphase Reactor Design
Credits 3.3 Lecture Hours.
Introduction and overview of catalyzed reactions; topics include heterogeneous catalysis and relevant surface science concepts, mass transport, and reactor design; discussion of industrially relevant chemistries.
Prerequisite: CHEN 624 or approval of instructor.

CHEN 635 Advanced Nanostructured Materials
Credits 3.3 Lecture Hours.
Chemical synthesis and characterization of materials with structures and properties in the nano-scale; emphasis on the fundamental science and engineering of understanding and manipulating "bottom-up" material formation.
Prerequisite: Approval of instructor.

CHEN 640 Rheology
Credits 3.3 Lecture Hours.
Principles of stress, deformation and flow; vector and tensor equations of fluid mechanics. Behavior of Newtonian, non-Newtonian and viscoelastic fluids.
Prerequisite: MATH 601 or approval of instructor.

CHEN 641 Polymer Engineering
Credits 3.3 Lecture Hours.
Principles and practice of polymer structure, synthesis, reaction mechanisms and kinetics; polymer characterization, chemical and physical properties degradation and recycling, melt and solid mechanical and rheological properties. Technology of production and processing operations.
Prerequisite: Graduate classification.

CHEN 642 Colloidal and Interfacial Systems
Credits 3.3 Lecture Hours.
Fundamental principles related to interactions, dynamic, and structure in colloidal and interfacial systems. Concepts covered include hydrodynamics, brownian motion, diffusion sedimentation, electrophoresis, colloidal forces, surface forces, polymeric forces, aggregation, deposition, equilibrium phase behavior, rheology, and experimental methods.

CHEN 643 Applied Statistical Mechanics of Fluids
Credits 3.3 Lecture Hours.
Application of molecular theories and computer simulation techniques to describe the thermodynamics and transport properties of fluids and fluid mixtures.
Prerequisite: CHEN 623 or approval of instructor.

CHEN 644 Nanotechnology: The Physics, Chemistry, and Engineering of Nanotechnology
Credits 3.3 Lecture Hours.
Introduction to the basics and tools of nanotechnology; nanotechnology approaches and algorithms to analyze, design and simulate systems; focus on developing, modifying, adapting and creating tools to solve problems in the field.
Prerequisite: Approval of instructor.

CHEN 650 Introduction to Microfabrication and Microfluidics Technology
Credits 3.3 Lecture Hours.
Micro Electro Mechanical Systems (MEMS Technology). To study the fundamentals of fluidics, heat and mass transfer, surface chemistry, and electrochemical interactions.

CHEN 651 Biochemical Engineering
Credits 3.3 Lecture Hours.
Integration of principles of engineering, biochemistry and microbiology; application to the design, development and improvement of industrial processes that employ biological materials. Engineering discipline directed toward creative application of interdisciplinary information to the economic processing of biological and related materials.
Prerequisite: Approval of instructor.
CHEN 653 Chemical Engineering in Tissue Engineering and Drug and Gene Delivery
Credits 3.3 Lecture Hours.
Application of chemical engineering principles to the examination of tissue engineering systems, metabolic engineering systems, drug design and delivery, and gene delivery.
Prerequisite: Approval of instructor.

CHEN 655/SENG 655 Process Safety Engineering
Credits 3.3 Lecture Hours.
Applications of engineering principles to process hazards analysis including source and dispersion modeling, emergency relief systems, fire and explosion prevention and mitigation, hazard identification, risk assessment, process safety management, etc.
Prerequisite: Approval of instructor.
Cross Listing: SENG 655/CHEN 655.

CHEN 658 Fundamentals of Environmental Remediation Processes
Credits 3.3 Lecture Hours.
Fundamental approach to various remediation technologies, topics in environmental thermodynamics and mass transfer, adsorption, desorption, ion exchange, air stripping, extraction, chemical oxidation, biodegradation.
Prerequisite: Graduate classification in engineering.

CHEN 660 Quantitative Risk Analysis
Credits 3.3 Lecture Hours.
Fundamental concepts, techniques, and applications of risk analysis and risk-informed decision making for engineering students. Practical uses of probabilistic methods are demonstrated in exercises and case studies from diverse engineering areas.
Prerequisites: Graduate or senior classification.
Cross Listing: SENG 660 and ISEN 660.

CHEN 661 Optimization of Chemical Engineering Processes
Credits 3.3 Lecture Hours.
Methods of optimization applied for the design and control of chemical engineering processes.
Prerequisite: Approval of instructor.

CHEN 662 Computational Chemistry and Molecular Modeling for Engineers
Credits 3.3 Lecture Hours.
Applications of computational chemistry and molecular modeling relevant to engineers, especially predictions for thermophysical properties and reaction rates; emphasis on the creative and intelligent use of commercial software to solve practical problems; problems relevant to process safety engineer.
Prerequisites: CHEN 623 and 624 or approval of instructor.

CHEN 663 Systems Biology
Credits 3.3 Lecture Hours.
Introduction to experimental and computational techniques in systems biology; includes high throughput experiments, data analysis, modeling and simulation; discussion in the context of specific applications such as signal transduction.
Prerequisite: Approval of instructor.

CHEN 664 Global Optimization of Chemical Engineering Problems
Credits 3.3 Lecture Hours.
Advances in global optimization and applications to chemical engineering systems; modeling and formulation of optimization problems, general theories and techniques of global optimization, and applications to problems on process design and integration.
Prerequisite: Approval of instructor.

CHEN 665 Sustainable Design of Chemical Processes
Credits 3.3 Lecture Hours.
Sustainability in chemical engineering; includes sustainable approaches to design and development of processes, products, energy usage; issues and roles of chemical engineers, service learning.
Prerequisite: Graduate and senior classification in engineering or approval of instructor.

CHEN 670 Computational Materials Science and Engineering
Credits 3.3 Lecture Hours.
Modern methods of computational modeling and simulation of materials properties and phenomena, including synthesis, characterization, and processing of materials, structures and devices; quantum, classical, and statistical mechanical methods, including semi-empirical atomic and molecular-scale simulations, and other modeling techniques using macroscopic input.
Prerequisites: Approval of instructor; graduate classification.
Cross Listing: MSEN 670 and MEMA 670.

CHEN 675 Microelectronics Process Engineering
Credits 3.3 Lecture Hours.
State-of-art process engineering principles on microelectronics, especially for the fabrication of very large scale integrated circuits (VLSICs); fundamental unit processes, such as thin film deposition, thermal growth, lithography, etching and doping, material structures and properties, and basic device operation principles.
Prerequisites: CHEN 623 and CHEN 624 or approval of instructor.

CHEN 677 Advanced Process Integration and Synthesis
Credits 3.3 Lecture Hours.
Systematic and state-of-the-art techniques of understanding the global insights of mass and energy flows within a process; use of integrated insights to optimize process performance; includes a variety of mathematical and visualization tools.
Prerequisite: Approval of instructor.

CHEN 681 Seminar
Credit 1.1 Lecture Hour.
Presentations and discussions covering problems of current importance in chemical engineering research.

CHEN 684 Professional Internship
Credit 1.1 Other Hour.
Engineering research experience in industrial setting away from Texas A&M campus; projects supervised jointly by faculty and industrial representative.
Prerequisites: Approval of student’s advisory committee chair and department head.

CHEN 685 Directed Studies
Credits 1 to 12.1 to 12 Other Hours.
Limited investigations in fields other than those chosen for thesis or dissertation research and not covered by other formal courses.
Prerequisite: Approval of department head.

CHEN 689 Special Topics in...
Credits 1 to 4.1 to 4 Lecture Hours.
Selected topics in particular areas of chemical engineering. May be repeated for credit.
Prerequisites: Approval of department head and instructor.

CHEN 691 Research
Credits 1 to 23.1 to 23 Other Hours.
Research for thesis or dissertation.
Prerequisite: Approval of department head.
CHEN 695 Graduate Mentoring Seminar I  
Credit 1. 1 Lecture Hour.  
Development of skills to complement formal research and coursework training; includes improvement of communication and interaction skills; development of technical writing and presentation skills.  
Prerequisites: Four chemical engineering core graduate courses; graduate advisor approval.

CHEN 696 Graduate Mentoring Seminar II  
Credit 1. 1 Lecture Hour.  
Development of a variety of skills to complement formal research and coursework training; includes improvement to communication/interaction with students in a classroom setting, and improvement and development of teaching skills. Must be taken on a satisfactory/unsatisfactory basis.  
Prerequisites: 4 CHEN core graduate courses, CHEN 695; graduate advisor approval.

CHIN - Chinese

Courses

CHIN 101 Beginning Chinese I  
Credits 4. 3 Lecture Hours. 2 Lab Hours.  
(CHIN 1411, 1511) Beginning Chinese I. Introduction to Chinese language, culture and history; development of communicative skills in daily conversation; ability to read and write some commonly used Chinese characters.

CHIN 102 Beginning Chinese II  
Credits 4. 3 Lecture Hours. 2 Lab Hours.  
(CHIN 1412, 1512) Beginning Chinese II. Further development of communicative skills in different aspects of daily Chinese conversation; ability to read and write about 150 commonly used characters.  
Prerequisite: CHIN 101 with a grade of C or better.

CHIN 201 Intermediate Chinese I  
Credits 3. 3 Lecture Hours.  
(CHIN 2311) Intermediate Chinese I. Development of comprehension and production of spoken Chinese, with emphasis on connected discourse; acquisition of advanced language points; ability to read and write 250 or more characters.  
Prerequisite: CHIN 102 with a grade of C or better.

CHIN 202 Intermediate Chinese II  
Credits 3. 3 Lecture Hours.  
(CHIN 2312) Intermediate Chinese II. Continued development of effective communication skills in different daily situations; ability to read and write simple, short paragraphs in Chinese.  
Prerequisite: CHIN 201 with a grade of C or better.

CHIN 285 Directed Studies  
Credits 1 to 4. 1 to 4 Other Hours.  
Individual supervision of readings or assigned projects selected for each student individually; written or oral reports.  
Prerequisite: Approval of instructor and Director of AALO.

CHIN 289 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of Chinese studies. May be repeated for credit.  
Prerequisite: Approval of instructor.

CHIN 301 Reading and Composition  
Credits 3. 3 Lecture Hours.  
Development of advanced proficiency in reading and writing through contact with various written and spoken styles of modern Chinese as reflected in newspaper reports, radio and TV broadcasts.  
Prerequisites: CHIN 202; junior or senior classification or approval of instructor.

CHIN 302 Reading and Composition II  
Credits 3. 3 Lecture Hours.  
Advanced proficiency in reading comprehension through contact with various written materials; development of cultural proficiency; development of writing skills with emphasis on new characters, new vocabulary and new sentence structures.  
Prerequisites: CHIN 301; junior or senior classification or approval of instructor.

CHIN 485 Directed Studies  
Credits 1 to 4. 1 to 4 Other Hours.  
Individual supervision of readings or assigned projects selected for each student individually; written or oral reports.  
Prerequisite: Approval of instructor and Director of AALO.

CHIN 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of Chinese studies. May be repeated for credit.  
Prerequisite: Approval of instructor.

CHIN 491 Research  
Credits 1 to 4. 1 to 4 Other Hours.  
Research in Chinese studies conducted under the direction of faculty member approved by the Director of AALO. May be taken 2 times for credit.  
Prerequisites: Junior or senior classification and approval of instructor.

CLAS - Classics

Courses

CLAS 101 Beginning Classical Greek I  
Credits 4. 4 Lecture Hours.  
(GREE 1411, 1511) Beginning Classical Greek I. Introduction to the language and culture of Greece; basic grammar and vocabulary; readings and slide lectures designed to place language study in its cultural and artistic context.

CLAS 102 Beginning Classical Greek II  
Credits 4. 4 Lecture Hours.  
(GREE 1412, 1512) Beginning Classical Greek II. Continuation of CLAS 101; basic grammar and vocabulary; readings and slide lectures designed to place language study in its cultural and artistic context.  
Prerequisite: CLAS 101.

CLAS 121 Beginning Latin I  
Credits 4. 4 Lecture Hours.  
(LATI 1411, 1511) Beginning Latin I. Introduction to grammar and vocabulary with a contrastive approach; reading of graded material.

CLAS 122 Beginning Latin II  
Credits 4. 4 Lecture Hours.  
(LATI 1412, 1512) Beginning Latin II. Completion of elementary grammatical structures; introduction to Latin historians.  
Prerequisite: CLAS 121.
CLAS 211 Intermediate Greek  
Credits 3. 3 Lecture Hours.  
(GREE 2311) Intermediate Greek. Completion of study of grammar and syntax; introduction to reading ancient Greek authors in the original language.  
Prerequisite: CLAS 102.

CLAS 220 History of Christianity: Origins to the Reformation  
Credits 3. 3 Lecture Hours.  
History of Christian doctrine, ecclesiastical organization, and religious practice, origins through Reformation, with emphasis on religion and society; life and teachings of Jesus; apostolic church; patristic period; Christianization of Roman Empire and northern Europe; monasticism; medieval church; Gregorian reform; heresy; papal monarchy; schism and conciliarism; reformation of the sixteenth century.  
Cross Listing: HIST 220 and RELS 220.

CLAS 221 Intermediate Latin I  
Credits 3. 3 Lecture Hours.  
(LATI 2311) Intermediate Latin I. Practice in reading Latin prose writings, especially historical writings and letters.  
Prerequisite: CLAS 122.

CLAS 222 Intermediate Latin II  
Credits 3. 3 Lecture Hours.  
Practice in reading Latin poetry writings, especially Vergil, Horace and Ovid.  
Prerequisite: CLAS 221.

CLAS 250 Greek and Roman Civilization  
Credits 3. 3 Lecture Hours.  
Introduction to the civilizations of classical antiquity from Bronze Age Greece to the dissolution of the Roman Empire; examination of major social, intellectual, and political developments in ancient Greece and Rome.

CLAS 251/RELS 251 Classical Mythology  
Credits 3. 3 Lecture Hours.  
Introduction to the most important myths of the Greeks and Romans; ancient and modern methods of interpreting myths; the role of myths in ancient literature; readings in English.  
Cross Listing: RELS 251/CLAS 251.

CLAS 285 Directed Studies  
Credits 0 to 4. 0 to 4 Other Hours.  
Individual supervision of readings or assigned projects in Classical Languages, selected for each student individually.  
Prerequisite: Approval of instructor and department head.

CLAS 289 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of Classical Languages. May be repeated for credit.  
Prerequisite: Approval of instructor.

CLAS 291 Research  
Credits 0 to 3. 0 to 3 Other Hours.  
Research conducted under the direction of faculty member in classical studies. May be taken three times for credit.  
Prerequisites: Freshman or sophomore classification and approval of department head.

CLAS 292 Advanced Latin Poetry  
Credits 3. 3 Lecture Hours.  
Readings of selections from ancient Greek authors of poetry (lyric, epic, or drama) in the original language; discussion of the intellectual, historical, and literary background of the works, and of the lives and thought of the writers. May be repeated for credit with different readings.  
Prerequisite: CLAS 211.

CLAS 300 Women in Ancient Greece and Rome  
Credits 3. 3 Lecture Hours.  
Survey of women in classical Greece and Rome; emphasis on female occupations and family relationships, legal and political status, traditional values, notorious women, how women were viewed and how they viewed themselves.  
Prerequisite: Junior or senior classification.  
Cross Listing: HIST 330 and WGST 330.

CLAS 322 Advanced Latin Poetry  
Credits 3. 3 Lecture Hours.  
Readings of selections from ancient Roman authors of poetry (lyric, satire, epic, or drama) in the original language; discussion of the intellectual, historical, and literary background of the works, and of the lives and thought of the writers. May be repeated for credit with different readings.  
Prerequisite: CLAS 222 or equivalent.

CLAS 330 Women in Ancient Greece and Rome  
Credits 3. 3 Lecture Hours.  
Survey of women in classical Greece and Rome; emphasis on female occupations and family relationships, legal and political status, traditional values, notorious women, how women were viewed and how they viewed themselves.  
Prerequisite: Junior or senior classification.  
Cross Listing: HIST 330 and WGST 330.

CLAS 352 Greek and Roman Drama  
Credits 3. 3 Lecture Hours.  
Dramatic literature of Ancient Greece and Rome; works of the major classical playwrights; the origins of comedy and tragedy; visual and musical aspects of production; political and intellectual ideas as reflected in the plays; readings in English.
CLAS 353/ANTH 353 Archaeology of Ancient Greece
Credits 3.3 Lecture Hours.
Archaeology of ancient Greece from the Stone Age until the ascent of Rome in the Hellenistic Period; remains of ancient Greek art (sculpture, mosaic, painting), architecture (temples, homes, civic structures), religion (figurines, votive offerings), and social history (coins, inscriptions).
Prerequisite: Junior or senior classification.
Cross Listing: ANTH 353/CLAS 353.

CLAS 354/ANTH 354 Archaeology of Ancient Italy
Credits 3.3 Lecture Hours.
Archaeology of ancient Italy from the Stone Age until the collapse of the Roman Empire in the fourth century; remains of ancient Etruscan and Roman art (sculpture, mosaic, painting), architecture (temples, homes, civic structures), religion (figurines, votive offerings), and social history (coins, inscriptions).
Prerequisite: Junior or senior classification.
Cross Listing: ANTH 354/CLAS 354.

CLAS 361 Greek Literature in Translation
Credits 3.3 Lecture Hours.
Literature of ancient Greece in its cultural context; Greek life and thought as revealed by its writers; development of the various genres of prose and poetry; readings in English.

CLAS 371 In Search of Homer and the Trojan War
Credits 3.3 Lecture Hours.
The nature, background, authorship and historicity of the Iliad and the Odyssey; Aegean culture in the Stone, Bronze and early Iron ages; the value of Greek epics as historical documents; oral poetry; the Trojan War in Greek literature; readings in English.

CLAS 372 Greek and Roman Epic
Credits 3.3 Lecture Hours.
Study of the ancient epic in its historical and cultural context; oral poetry; Homer, archaeology, and history; creation of Greek mythology; Alexandrian written epic; early Latin epic; Vergil's Aeneid as national epic; Vergil and the Homeric tradition; Silver Age Latin epics; readings in English.
Prerequisite: Sophomore classification or approval of instructor.

CLAS 381 Ancient Athletics
Credits 3.3 Lecture Hours.
Study of Greek and Roman athletics in their cultural and historical contexts through the examination of ancient literary, archaeological, and artistic sources; readings in English.

CLAS 410 Seminar in Classical Studies
Credits 3.3 Lecture Hours.
Exploration of a significant topic, work, or period in Greek or Roman literature, culture, or history; emphasis on development of research skills in Classical Studies. May be taken three times for credit.
Prerequisite: Junior or senior classification, or approval of instructor.

CLAS 415/FILM 415 The Ancient World in Film
Credits 3.3 Lecture Hours.
Study of modern films as they relate to ancient literary texts that inspired them or with which they share common themes; relationship between Greek epic, tragedy, and comedy and their cinematic adaptations; treatment of Rome as an idea or ideal in the work of both ancient Romans and modern filmmakers.
Prerequisite: Junior or senior classification, or approval of instructor.
Cross Listing: FILM 415/CLAS 415.

CLAS 417/ANTH 417 Naval Warfare and Warships in Ancient Greece and Rome.
Credits 3.0. Credit 3
Extensive survey of Greek and Roman warships, naval warfare, naval strategy and tactics drawing upon archaeological evidence, literary documentation and iconographic material, from the Bronze Age (Ancient Egypt and the mythical Trojan War) to the Imperial Roman Navy.
Prerequisite: Junior or senior classification.

CLAS 418 European Intellectual History from Ancient Greece to the Early Middle Ages
Credits 3.3 Lecture Hours.
Political and social history of selected major figures and important movements in political theory, literature, sociology, art, economics and philosophy from Pre-Socratic Greece through the formative stages of the Christian Middle Ages.
Prerequisite: Junior or senior classification, or approval of instructor.

CLAS 426/HIST 426 The Ancient Greeks
Credits 3.3 Lecture Hours.
Greek History and civilization from the Archaic Age to Alexander the Great (8th-late 4th century B.C.).
Prerequisite: Junior or senior classification, or approval of instructor.
Cross Listing: HIST 426/CLAS 426.

CLAS 427/HIST 427 The Roman Republic I: The Empire Builders
Credits 3.3 Lecture Hours.
Roman history and civilization from the beginnings of the Republic (6th/5th century B.C.) to the late 2nd century B.C.
Prerequisite: Junior or senior classification, or approval of instructor.
Cross Listing: HIST 427/CLAS 427.

CLAS 428/HIST 428 The Roman Republic II: The Civil Wars
Credits 3.3 Lecture Hours.
Roman history and civilization from the late 2nd century B.C. to the 1st century A.D.
Prerequisite: Junior or senior classification, or approval of instructor.
Cross Listing: HIST 428/CLAS 428.

CLAS 429/HIST 429 The Roman Empire
Credits 3.3 Lecture Hours.
Roman History and civilization of the Imperial Period (1st century B.C.-6th century A.D.)
Prerequisite: Junior or senior classification, or approval of instructor.
Cross Listing: HIST 429/CLAS 429.

CLAS 444/ANTH 444 Classical Archaeology
Credits 3.3 Lecture Hours.
History of the discipline through the individuals, organizations, excavations, theoretical models and ethical issues that have shaped it.
Prerequisites: Junior or senior classification; ANTH 353/CLAS 353, ANTH 354/CLAS 354, CLAS 353/ANTH 353 or CLAS 354/ANTH 354.
Cross Listing: ANTH 444/CLAS 444.

CLAS 485 Directed Studies
Credits 0 to 4.0 to 4 Other Hours.
Individual supervision of readings or assigned projects, selected for each student individually.
Prerequisite: Approval of instructor and department head.
CLAS 489 Special Topics in...
Credits 1 to 4.1 to 4 Lecture Hours.
Selected topics in an intensified area of classical languages and culture. May be repeated for credit.
Prerequisite: Approval of instructor.

CLAS 491 Research
Credits 0 to 3.0 to 3 Other Hours.
Research conducted under the direction of faculty member in classical studies. May be taken three times for credit.
Prerequisites: Junior or senior classification and approval of department head.

CLAS 692 Readings
Credits 3.3 Lecture Hours.
Readings in Greek or Latin literary texts in the original language.
Prerequisite: Graduate classification.

COMM - Communication

Courses

COMM 101 Introduction to Communication
Credits 3.3 Lecture Hours.
(SPCH 1311) Introduction to Communication. Survey of communication topics, research, and contexts of communicative practice; overview of communication from both humanities and social science perspectives.

COMM 203 Public Speaking
Credits 3.3 Lecture Hours.
(SPCH 1315) Public Speaking. Training in speeches of social and technical interest designed to teach students to develop and illustrate ideas and information and to inform, stimulate, and persuade their audiences.

COMM 205 Communication for Technical Professions
Credits 3.3 Lecture Hours.
Design and presentation of oral reports for technical professions; incorporation of visual and graphic materials into presentation required; written reports required.

COMM 210 Group Communication and Discussion
Credits 3.3 Lecture Hours.
(SPCH 2333) Group Communication and Discussion. Definition, structure, and functions of groups; group productivity, codes in verbal and nonverbal communication; problem-solving, role-playing, decision-making; leadership and organization; interview principles and techniques.

COMM 215/JOUR 215 Interviewing: Principles and Practice
Credits 3.3 Lecture Hours.
(COMM 2316, SPCH 2316) Interviewing: Principles and Practice. Theory and practice of methods in selected interview settings; emphasis on communication between two persons, questioning techniques, and the logical and psychological bases of interpersonal persuasion.
Cross Listing: JOUR 215/COMM 215.

COMM 230/JOUR 230 Communication Technology Skills
Credits 3.3 Lecture Hours.
Introduction to interactive media and media literacy skills in the digital domain; survey of technology histories, standards and markets for industries such as multichannel TV, digital radio, video games, streaming media, epublishing, teleconferencing and social networking.
Prerequisite: Communication or telecommunication media studies majors.

COMM 240 Rhetorical Criticism
Credits 3.3 Lecture Hours.
Principles and practice of the analysis of speeches and other forms of public discourse; compares systems of rhetorical criticism, such as neo-classical analysis, mythic analysis, rhetorical genres and close textual analysis.

COMM 243 Argumentation and Debate
Credits 3.3 Lecture Hours.
(SPCH 2335) Argumentation and Debate. Principles of argumentation and skills of debate, including reasoning, evidence, refutation, and briefing.

COMM 250/JOUR 250 New Media and the Independent Voice
Credits 3.3 Lecture Hours.
Examination of new media as independent voices for cultural and political movements; principles governing the design, presentation, and evaluation of blogs as a persuasive medium in society.
Cross Listing: JOUR 250/COMM 250.

COMM 280 Careers in Communication
Credit 1.1 Lecture Hour.
Introduction to careers in communication; emphasis on strengths and personality in selecting a profession, application letters, information interviews, mock interviews; must be taken on satisfactory/unsatisfactory basis.
Prerequisites: Sophomore classification or approval of instructor; COMM and TCMS majors.

COMM 285 Directed Studies
Credits 1 to 3.1 to 3 Other Hours.
Individual supervision of readings or assigned projects in communication. May be taken two times for credit.
Prerequisites: Approval of instructor and assigned project in communication.

COMM 289 Special Topics in...
Credits 1 to 4.1 to 4 Lecture Hours.
Selected topics in an identified area of communication. May be repeated for credit.
Prerequisite: Approval of instructor.

COMM 291 Research
Credits 0 to 3.0 to 3 Other Hours.
Research conducted under the direction of faculty member in the department of communication. May be repeated 3 times for credit.
Prerequisites: GPA 2.5 or higher; freshman or sophomore classification and approval of instructor and department head.

COMM 301 Rhetoric in Western Thought
Credits 3.3 Lecture Hours.
Historical and critical evaluation of rhetorical theory from the classical era to the contemporary period--from Aristotle to Kenneth Burke. Major theories of communication and persuasion developed in Europe and America.
Prerequisite: Junior or senior classification.

COMM 305 Theories of Communication
Credits 3.3 Lecture Hours.
Theoretical approaches to human communication, including selected theories of language behavior, interpersonal and small group interaction, and persuasion.
Prerequisite: Any lower-division communication course, or junior classification, or approval of instructor.
COMM 307/JOUR 301 Mass Communication, Law, and Society
Credits 3.3 Lecture Hours.
Mass media as social institutions; social responsibility and ethics of the press; history, constitutional development, and law of the First Amendment.
Prerequisite: Any lower-division communication course, or junior classification, or approval of instructor.
Cross Listing: JOUR 301/COMM 307.

COMM 308 Research Methods in Communication
Credits 3.3 Lecture Hours.
Survey of methods used in communication research including quantitative, interpretive and rhetorical methods; formulating research questions, determining the appropriate method, planning and designing the research, data collection, and data analysis and interpretation.
Prerequisite: MATH 141 or MATH 166, and MATH 131 or MATH 142 or MATH 151 or PHIL 240; or MATH 151 and MATH 152.

COMM 315 Interpersonal Communication
Credits 3.3 Lecture Hours.
Speech interaction in person-to-person settings; concepts of perception, attraction, self-disclosure, listening, and conflict management through communication; speech interaction patterns and stages in the development of interpersonal communication.
Prerequisite: Junior or senior classification.

COMM 320 Organizational Communication
Credits 3.3 Lecture Hours.
Speech communication behavior and networks within organizations; recent research on speech communication systems, communication climate, and communication barriers in organizational settings.
Prerequisite: Junior or senior classification.

COMM 321 Strategic Communication Case Studies
Credits 3.3 Lecture Hours.
Strategic communication practice; application of skills including communication research, media writing and advanced media writing, visual media and public speaking; service-learning as not-for-fee consultant to a community organization.
Prerequisites: COMM 323 and junior or senior classification or approval of instructor.

COMM 322 Communication Tactics
Credits 3.3 Lecture Hours.
Examination of strategic use of communication tactics; analysis of new and digital media in organizational and public communication; skill development in strategic use of communication tactics including writing for new media, researching, planning, integrating and evaluation effectiveness of traditional and new media tactics in strategic public communication.
Prerequisite: COMM 323, junior or senior classification.

COMM 323 Strategic Communication
Credits 3.3 Lecture Hours.
Application of strategic communication tools to create and influence policy, to improve profit and non-profit strategic communication planning.
Prerequisite: Junior or senior classification.

COMM 324 Communication Leadership and Conflict Management
Credits 3.3 Lecture Hours.
Communication perspective of leadership, of conflict, of management of conflict in interpersonal, group and societal contexts; models of leadership as communication phenomenon; use of symbols by leaders to foster collaboration, systemic constructionist approach.
Prerequisite: Junior or senior classification.

COMM 325 Persuasion
Credits 3.3 Lecture Hours.
Theory of effective persuasive communication in interpersonal, small group, and public settings; audience analysis, ethics of persuasion, motivational factors, psychological and rhetorical principles, source credibility, and theories of attitude change.
Prerequisite: Junior or senior classification.

COMM 327 American Oratory
Credits 3.3 Lecture Hours.
Survey of significant American oratory; critical analysis of important speeches in their historical, political, social, and philosophical contexts.
Prerequisite: Junior or senior classification.

COMM 330 Technology and Human Communication
Credits 3.3 Lecture Hours.
Nontechnical survey of how modern technologies influence human communication including an introduction to communication technologies; the influence of technology on interpersonal communication, group decision-making and public communication; an analysis of argumentation and persuasion in technological issues.

COMM 335 Intercultural Communication
Credits 3.3 Lecture Hours.
Communication variables in intercultural contexts including culture and meaning, nonverbal styles across cultures, patterns of symbolic transfer, culture shock and communication, values in intercultural dialogue.
Prerequisite: Junior or senior classification.

COMM 340 Communication and Popular Culture
Credits 3.3 Lecture Hours.
Survey of theories and concepts of popular culture; dynamic relationships between pop culture and television, film, sports, politics and leisure.
Prerequisite: Any lower-division communication course, or junior classification, or approval of instructor.

COMM 345 Media Industries
Credits 3.3 Lecture Hours.
Survey of the business organization, economic structures and processes, and regulations of the media industry.
Prerequisite: Any lower-division communication course, or junior classification, or approval of instructor.

COMM 350 Theories of Mediated Communication
Credits 3.3 Lecture Hours.
Survey of different theories of mediated communication processes and effects; functions of theories in social scientific research on media and mediated processes.
Prerequisite: Any lower-division communication course, or junior classification, or approval of instructor.

COMM 354 Political Economy of Telecommunication
Credits 3.3 Lecture Hours.
Survey of the political economy of the telecommunication industries both at the national and global level, including regulations and policies, global infrastructure and types of networks.
Prerequisite: Any lower-division communication course, or junior classification, or approval of instructor.

COMM 360 Cultural History of the Media
Credits 3.3 Lecture Hours.
Origins and development of the mass media; their influence on social, political, and cultural change; history of mass communication from historical, sociological, and cultural perspectives.
Prerequisite: Any lower-division communication course, or junior classification, or approval of instructor.
COMM 365/JOUR 365 International Communication
Credits 3.3 Lecture Hours.
Mass media, international, and cross-cultural audiences; theoretical, pragmatic, political and ethical issues; including cultural differences, comparative media systems, development communication, patterns of world news flow, political propaganda, impact of international advertising and other issues.
Prerequisite: Junior or senior classification.
Cross Listing: JOUR 365/COMM 365.

COMM 370 Health Communication
Credits 3.3 Lecture Hours.
Survey of theory and research in health communication, including interaction between patients and providers, communication in health care organizations, health care campaigns, and cultural meanings of health and illness.
Prerequisite: Any lower-division communication course, or junior classification, or approval of instructor.

COMM 375 Media Audiences
Credits 3.3 Lecture Hours.
Media audiences; research and theory; processes and effects of mass communication; audience members’ uses and interpretations of media; topics including political media, news, and entertainment, health and information campaigns, children and other special audiences.
Prerequisite: Any lower-division communication course, or junior classification, or approval of instructor.

COMM 403 Media, Children and Adolescents
Credits 3.3 Lecture Hours.
Critical analysis of popular culture and mass media issues related to children and adolescents; deconstruction of media created by, for and about children and youth.
Prerequisite: Junior or senior classification or approval of instructor.

COMM 407/WGST 407 Women, Minorities and the Mass Media
Credits 3.3 Lecture Hours.
The contributions of women and ethnic groups to the evolution of the media; the portrayal of women and ethnic groups in the mass media; issues resulting from the recognition of women and ethnic groups as media audiences.
Prerequisites: Junior or senior classification and approval of instructor.
Cross Listing: WGST 407/COMM 407. Majors only or approval of program coordinator.

COMM 408 Advanced Research Methods in Communication
Credits 3.3 Lecture Hours.
Advanced research methods in communication including experimental, survey, interpretive, and critical methods; emphasis on research design, data collection, analysis, interpretation, and presentation.
Prerequisite: Junior or senior classification; COMM 308.

COMM 410 Radio, Records, and Popular Music
Credits 3.3 Lecture Hours.
History of radio and record industries; communication technology and media industries related to American popular music; interaction of communication technologies, media industries, social and cultural processes in evolution of popular music.
Prerequisite: Any lower-division communication course, or junior classification, or approval of instructor.

COMM 411/WGST 411 Representations of Motherhood
Credits 3.3 Lecture Hours.
Examination of understandings of motherhood from a humanities perspective and over a variety of cultures and time periods, as reflected in written, media and/or oral texts.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: WGST 411/COMM 411.

COMM 415 New Media and Civil Society
Credits 3.3 Lecture Hours.
Critical analysis of new media technologies, civic participation, and social capital in democratic, non-democratic, and nascent civil societies around the world.
Prerequisite: Any lower-division communication course, or junior classification, or approval of instructor.

COMM 420/WGST 420 Gender and Communication
Credits 3.3 Lecture Hours.
Survey of the role of gender in communication processes; focus on communication differences between men and women in contexts such as the family, school and work organizations; discussion of media influence in gender stereotypes.
Cross Listing: WGST 420/COMM 420.

COMM 425/AFST 425 Rhetoric of the Civil Rights Movement
Credits 3.3 Lecture Hours.
Rhetorical evaluation of theoretical literature and pragmatic episodes that shaped the U.S. Civil Rights Movement; examination of significant speeches, documents, and protest activities in their historical, political, and social contexts.
Cross Listing: AFST 425/COMM 425.

COMM 428/WGST 428 Women’s Rhetoric
Credits 3.3 Lecture Hours.
Examination of the historical imbrication of masculinity and rhetoric in relation to women’s participation in political life, reception of women’s rhetoric in the public sphere, and remembrance and representation of women as rhetorical agents throughout history; consideration of women’s rhetoric in various cultural arenas.
Prerequisite: Junior or senior classification.
Cross Listing: WGST 428/COMM 428.

COMM 431 Rhetoric of Social Movements
Credits 3.3 Lecture Hours.
Survey of events and rhetorical documents of major U.S. social movements, including abolitionist, labor, socialist, women’s rights, civil rights, pro-life, gay and lesbian, and student movements.
Prerequisites: COMM 301; junior or senior classification.

COMM 434 Topics in Rhetorical Theory
Credits 3.3 Lecture Hours.
Application of rhetorical theories and concepts to rhetorical problems and methods; emphasis on the relationship between theory and practice. May be taken two times for credit.
Prerequisite: Junior or senior classification.

COMM 435 Rhetoric of Television and Film
Credits 3.3 Lecture Hours.
Critical analysis of television and film; close readings of such mediated texts; special attention to writing television and film criticism.

COMM 437 Visual Communication
Credits 3.3 Lecture Hours.
Critical analysis of visual communication including photographs, advertising, memorials, tattoos, comics, public protest.
Prerequisite: Junior or senior classification.
COMM 438 Propaganda
Credits 3. 3 Lecture Hours.
Examination of common propaganda strategies in contemporary mass mediated environments.
Prerequisite: Junior or senior classification.

COMM 440 Political Communication
Credits 3. 3 Lecture Hours.
Rhetorical analysis of messages, media and speakers in political campaigns, institutions and movements.

COMM 443 Communication and Conflict
Credits 3. 3 Lecture Hours.
Communication principles for addressing conflict situations through such practices as negotiation, mediation and arbitration: the study of strategies, influence and language in conflict management approaches.
Prerequisite: Any lower-division communication course, or junior classification, or approval of instructor.

COMM 446 Communication, Organizations and Society
Credits 3. 3 Lecture Hours.
Communicative processes through which organizations influence and are influenced by the societies from which they draw their members.
Prerequisite: Any lower-division communication course, or junior classification, or approval of instructor.

COMM 447 Communication, Group Processes and Collaboration
Credits 3. 3 Lecture Hours.
Communication processes in teamwork including collaboration in dyads, teams, and group processes that contribute to or detract from team effectiveness.
Prerequisites: COMM 210; junior or senior classification.

COMM 449 Activism and Communication
Credits 3. 3 Lecture Hours.
Examination of communicative behaviors used by individuals, grassroots, and established organizations in strategic ways to advocate on behalf of issues, groups, or actions perceived as pro-social or for the betterment of society.
Prerequisite: Junior or senior classification.

COMM 450 Media Campaigns
Credits 3. 3 Lecture Hours.
Principles of designing media campaigns as applied to commercial advertising, political advertising and health campaigns; processes that drive the planning and execution of these campaigns.
Prerequisite: Any lower-division communication course, or junior classification, or approval of instructor.

COMM 452 Cultural Studies of Communication Technology
Credits 3. 3 Lecture Hours.
Exploration of theories concerning technology; emphasis on technological culture; examination of the emergence of and societal reactions to technologies during modern era; consideration of utopian/dystopian discourse of technology in popular media narratives; contemplation of technology as constitutive of power and knowledge.
Prerequisite: Junior or senior classification.

COMM 453 Communication and Video Games
Credits 3. 3 Lecture Hours.
Business and industry aspects of video games; cultural and social aspects of gaming.
Prerequisite: Junior or senior classification.

COMM 454 Telecommunication Policy
Credits 3. 3 Lecture Hours.
Telecommunication policy, including intellectual property, first amendment protections, privacy, universal service, government support, national information policy, standard setting and deregulation; implications for managers and consumers of telecommunication.
Prerequisites: COMM 354; junior or senior classification.

COMM 458/JOUR 458 Global Media
Credits 3. 3 Lecture Hours.
Study of globalization through media ownership; content, flow, cultural values, political power and technological impact; implications of globalization for local economies and audiences.
Prerequisite: Any lower-division communication course, or junior classification, or approval of instructor.
Cross Listing: JOUR 458/COMM 458.

COMM 460 Communication and Contemporary Issues
Credits 3. 3 Lecture Hours.
Rhetorical and other critical approaches to study how communication practices influence the construction of social issues. May be taken two times.

COMM 470 Communication in Health Care Contexts
Credits 3. 3 Lecture Hours.
Principles of health communication applied in situations ranging from physician-patient communication to public health campaign theory, design, implementation and evaluation. May be taken two times.

COMM 471 Media, Health and Medicine
Credits 3. 3 Lecture Hours.
Analysis and evaluation of representations of health in media; examination of gender, class and race as they intersect with health issues.
Prerequisite: Junior or senior classification.

COMM 475/ARAB 475 Media and the Middle East
Credits 3. 3 Lecture Hours.
Examination of how media (e.g., literature, news, film, television) contribute to our understanding of historical events in the Middle East; analysis of cultural, social, political and historical circumstances of media representation of events; exploration of various media genres’ techniques and narrative structure. May be taken two times for credit with a focus on different medium.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: ARAB 475/COMM 475.

COMM 480/RELS 480 Religious Communication
Credits 3. 3 Lecture Hours.
The role of religious communication as manifested in speeches, sermons, debates, campaigns, and social movements throughout history. May be taken two times for credit.
Cross Listing: RELS 480/COMM 480.

COMM 484 Internship in Communication
Credits 0 to 23. 0 to 23 Other Hours.
Directed internship in a public or private organization to provide students with on-the-job training and applied research experience; application of communication theory and practice in career settings; designed to enhance and clarify students’ career objectives. May be repeated for credit. Must be taken S/U.
Prerequisites: Cumulative GPR of 2.5 or higher for credits taken in residence; approval of department head.
COMM 485 Directed Studies  
Credits 0 to 3. 0 to 3 Other Hours. 
Directed individual study of identified topics in communication; may include specific research, readings or other approved project in any area of communication; written report is required. May be repeated for credit.  
Prerequisites: Cumulative GPR of 2.5 or higher; approval of instructor and department head.

COMM 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours. 
Selected topics in an identified area of communication. May be repeated for credit.

COMM 491 Research  
Credits 0 to 3. 0 to 3 Other Hours. 
Research conducted under the direction of faculty member in the department of communication. May be repeated 3 times for credit.  
Prerequisites: GPA 2.5 or higher; junior or senior classification and approval of instructor and department head.

COMM 497 Independent Honors Studies  
Credits 0 to 3. 0 to 3 Other Hours. 
Directed independent studies for upper division Honors students, regardless of academic major, in select aspects of communication. May be repeated for credit.  
Prerequisites: Junior or senior classification either as Honors student or with GPR of 3.25; letter of approval from head of student's department.

COMM 610 Social Science Methods in Communication Research  
Credits 3. 3 Lecture Hours. 
Quantitative research methods in communication, including design, measurement and analysis for descriptive and experimental research; practice in evaluating and conducting research projects.  
Prerequisite: Graduate classification or approval of instructor.

COMM 615 Interpretive Methods in Communication Research  
Credits 3. 3 Lecture Hours. 
Introduction to interpretive and qualitative methods in communication research; underlying epistemologies, design issues, and explanation of knowledge claims; methods including participant observation and interviewing.  
Prerequisite: Graduate classification.

COMM 620 Communication Theory  
Credits 3. 3 Lecture Hours. 
The nature and role of communication theory; systems of ontology and epistemology in theory development; critical review of current theories concerning communication codes, functions and processes in various contexts.  
Prerequisite: Graduate classification or approval of instructor.

COMM 630 Interpersonal Communication  
Credits 3. 3 Lecture Hours. 
Major theories in interpersonal communication; critical examination of current research programs on communication in interpersonal influence, relational development and conflict management.  
Prerequisite: Graduate classification.

COMM 631 Group Communication  
Credits 3. 3 Lecture Hours. 
Major concepts and theories of communicative processes in task-oriented groups from a social scientific perspective; the role of group communication in (1) group decision processes, (2) decision development, (3) decision-making agendas, and (4) conflict and performance quality.  
Prerequisite: Graduate classification.

COMM 632 Communication and Conflict  
Credits 3. 3 Lecture Hours. 
Elements and central features of conflict theories and different approaches to communication in conflict management; analysis of communication research in interpersonal, family/marital, group, organizational, and public conflicts and the role of the media in social and international disputes.  
Prerequisite: Graduate classification.

COMM 634 Communication and Gender  
Credits 3. 3 Lecture Hours. 
Gender considered as a complex phenomenon constituted through communication; topics include femininities, masculinities, language, power, nonverbal behavior, gender in media, organizations, interpersonal relationships, and social movements.  
Prerequisite: Graduate classification.

COMM 636 Survey of Organizational Communication  
Credits 3. 3 Lecture Hours. 
Theoretical and empirical literature on human communication and complex organizations; the study of messages, interaction, and meaning in the process of organizing; topics include superior-subordinate communication, communication networks, and technologies, language, message flow, symbols and organizational culture, negotiation and conflict, and power and politics.  
Prerequisite: Graduate classification.

COMM 637 Organizational Communication Seminar  
Credits 3. 3 Lecture Hours. 
Investigation of a subject important to the understanding of organizational communication, such as communication and organizational decision-making, group communication within organizations, communication and organizational culture, and organizational rhetoric and issue management. May be repeated for credit with different content up to a total of three times.  
Prerequisite: Graduate classification.

COMM 640 Rhetorical Theory  
Credits 3. 3 Lecture Hours. 
Close reading of classical and contemporary systems of rhetoric; survey of principal applications to communication theory and research.  
Prerequisite: Graduate classification or approval of instructor.

COMM 645 Rhetorical and Textual Methods in Communication Research  
Credits 3. 3 Lecture Hours. 
Comparative study of traditional and contemporary perspectives on the description, interpretation, and evaluation of public discourse, including textual analysis, neo-classical analysis, Burkean criticism, quantitative and qualitative approaches to content analysis, fantasy theme analysis, and semiotic analysis.  
Prerequisite: Graduate classification or approval of instructor.

COMM 649 American Public Discourse to 1865  
Credits 3. 3 Lecture Hours. 
Public discourse and political rhetoric in America in colonial and pre-Civil War years; historical, conceptual, and practical examination of political campaign rhetoric, legislative rhetoric, judicial rhetoric, and advocacy group rhetoric.  
Prerequisite: Graduate classification.

COMM 650 American Public Discourse Since 1865  
Credits 3. 3 Lecture Hours. 
Public discourse and political rhetoric in America in post-Civil War years; historical, conceptual, and practical examination of political campaign rhetoric, legislative rhetoric, judicial rhetoric, and advocacy group rhetoric.  
Prerequisite: Graduate classification.
COMM 651 Presidential Rhetoric
Credits 3.3 Lecture Hours.
Rhetorical discourse of American presidents, including principal genres of presidential communication, speechwriting and media strategies; case studies of presidential communication ranging from campaign oratory, to crisis rhetoric, and ceremonial addresses.
Prerequisite: Graduate classification.

COMM 652 The Rhetoric of Social Movements
Credits 3.3 Lecture Hours.
Analysis of persuasive strategies used to build social identities and collectively agitate for social change; exploration of the history of social movements in the United States and abroad.

COMM 653 Rhetoric and Public Culture
Credits 3.3 Lecture Hours.
Examination of how artifacts of public culture function rhetorically to transform public attitudes, opinion and memory; analysis of documents, artworks, images and histories from a humanities and social science perspective.

COMM 654/ENGL 654 Classical Rhetoric
Credits 3.3 Lecture Hours.
Origins of rhetoric in classical Greece and Rome; exploration of the relationship between philosophy, rhetoric and democratic political culture; the contemporary relevance of classical thought to contemporary problems.
Cross Listing: ENGL 654/COMM 654.

COMM 655/ENGL 655 Contemporary Theories of Rhetoric
Credits 3.3 Lecture Hours.
Investigation of the major figures in rhetorical theory in the 20th and 21st centuries; analysis of the relationship between rhetoric and power; identifying new challenges for rhetoric in global, multicultural, technological age.
Cross Listing: ENGL 655/COMM 655.

COMM 656/WGST 652 Feminism and Rhetoric
Credits 3.3 Lecture Hours.
Historical development of the ideology, theory and rhetorical practices of U.S. feminism; criticism of significant artifacts of women orators and writers from the 19th century to contemporary times.
Cross Listing: WGST 652/COMM 656.

COMM 658 Seminar in Communication and Culture
Credits 3.3 Lecture Hours.
Investigation of the ways that culture, religion, identity, gender, popular culture, community, history, and related ideas are shaped through communication in order to understand the development of social norms, political values, and the human experience. May be repeated for credit with different content up to a total of three times.
Prerequisite: Graduate classification.

COMM 659 Communication and Citizenship in the Public Sphere
Credits 3.3 Lecture Hours.
Theoretical examination of communication within democratic, republican, and liberal conceptions of citizenship: consideration of the ideal of the public sphere, and communication in global civil society; specific attention to the practices of American citizenship within the global civil society.
Prerequisite: Graduate classification.

COMM 662 Survey of Telecommunication and Media Studies
Credits 3.3 Lecture Hours.
Survey of research and theory in media studies and telecommunication, review of literature on mass communication, media, culture, and society, media audiences, texts, industries, and technologies; provides an overview of the literature and theoretical orientation.
Prerequisite: Graduate classification.

COMM 663 Seminar in Telecommunication and Media Studies
Credits 3.3 Other Hours.
Intensive work on selected topics of research in telecommunication and media studies; may address work in the areas of audience studies, media effects, industries, policy, international issues, media and culture, media history, or theory; may be repeated for credit with different content up to a total of three times.
Prerequisite: Graduate classification.

COMM 665 Communication and Technology
Credits 3.3 Lecture Hours.
Examines the relationships between human communication and technology, investigating the social effects of communication technologies, the quality of messages, communicative practices, and rhetorical norms that typify effective communication in technological society.
Prerequisite: Graduate classification.

COMM 666 Survey of Telecommunication and Media Studies
Credits 3.3 Lecture Hours.
Theories and research in health communication considering functions and outcomes of communication processes in various health contexts, ranging from interpersonal settings to public campaigns; emphasis on providing a framework for synthesizing and critically evaluating health communication research.
Prerequisite: Graduate classification.

COMM 667 Health Communication Seminar
Credits 3.3 Lecture Hours.
Investigation of a subject important to the understanding of health communication, such as persuasion and public health campaigns, physician-patient communication, or communication in health care organizations. May be repeated for credit with different content up to a total of three times.
Prerequisites: Graduate classification and approval of instructor.

COMM 668 Seminar in Prevention Science
Credit 1.1 Lecture Hour.
Contemporary research programs that represent the interdisciplinary field of prevention science; strengths and limitations of diverse theoretical and conceptual bases of research in prevention science; application of research findings to issues related to the prevention of mental, emotional, and physical health problems and the promotion of well-being. May be taken 3 times for credit.
Prerequisite: Graduate standing and enrollment in the interdisciplinary graduate certificate in prevention science or approval of instructor.
Cross Listing: HLTH 671, RPTS 620 and SPSY 620.

COMM 669 Survey of Health Communication
Credits 3.3 Lecture Hours.
Theories and research in health communication considering functions and outcomes of communication processes in various health contexts, ranging from interpersonal settings to public campaigns; emphasis on providing a framework for synthesizing and critically evaluating health communication research.
Prerequisite: Graduate classification.

COMM 670 Health Communication Seminar
Credits 3.3 Lecture Hours.
Investigation of a subject important to the understanding of health communication, such as persuasion and public health campaigns, physician-patient communication, or communication in health care organizations. May be repeated for credit with different content up to a total of three times.
Prerequisites: Graduate classification and approval of instructor.

COMM 671 Interdisciplinary Seminar in Prevention Science
Credit 1.1 Lecture Hour.
Contemporary research programs that represent the interdisciplinary field of prevention science; strengths and limitations of diverse theoretical and conceptual bases of research in prevention science; application of research findings to issues related to the prevention of mental, emotional, and physical health problems and the promotion of well-being. May be taken 3 times for credit.
Prerequisite: Graduate standing and enrollment in the interdisciplinary graduate certificate in prevention science or approval of instructor.
Cross Listing: HLTH 671, RPTS 620 and SPSY 620.

COMM 681 Professional Seminar
Credit 1.1 Other Hour.
Provides socialization to the profession of communication, focusing on graduate students' roles as scholars and teachers; provides instruction on teaching communication, conducting and writing publishable research, and fulfilling responsibilities to one's organization and profession. May be repeated up to three times.
Prerequisite: Graduate classification.
COSC - Construction Science

Courses

COSC 153 Introduction to the Construction Industry
Credits 3.3 Lecture Hours.
Characteristics of the construction industry; types of construction companies; contracts; people involved in a project, their responsibilities and interrelationships; evolution of a project; interpreting working drawings; construction bonds; contract documents.

COSC 175 Construction Graphics Communication
Credits 3.3 Lecture Hours.
Visualization, interpretation and communication of graphical geometry in construction design and engineering; graphical analysis of problems; sketching applications, computer aided design, and fundamentals of information modeling software; introduction to common quantitative tools in construction.
Prerequisite: COSL majors only.

COSC 253 Construction Materials and Methods I
Credits 3.3 Lecture Hours.
(ARCH 2312) Construction Materials and Methods I. Materials, methods and sequences of the construction process; emphasis on design, specification, purchase and use of concrete, masonry and wood.

COSC 254 Construction Materials and Methods II
Credits 3.3 Lecture Hours.
(ARCH 2313) Construction Materials and Methods II. Analysis of materials and methods used in the design and construction of buildings with a particular emphasis on structures using structural steel reinforced concrete and dimensional framing lumber.
Prerequisite: COSC 253.

COSC 275 Estimating I
Credits 3.2 Lecture Hours. 3 Lab Hours.
Systems approach to determining required quantities of construction materials; quantification of various types of foundation systems, structural systems and building envelope systems; excerpts of contract documents from a variety of different building projects.
Prerequisites: COSC 175; COSC 254.

COSC 284 Introduction to Applied Workplace Ethics, Etiquette and Communications
Credits 3.3 Lecture Hours.
For students in an experiential learning environment; required reading assignments on topics concerning workplace ethics, etiquette and communications; apply and discuss reflective writing assignments in order to prepare to meet the professional expectations of employers upon graduation.
Prerequisite: Engaged in an internship, co-op or other experiential learning opportunity working a minimum of 20 hours per week.

COSC 285 Directed Studies
Credits 1 to 3. 1 to 3 Other Hours.
Special project in construction science. Project must be approved by the department.
Prerequisite: Approval of department head.

COSC 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in construction science. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification; approval of instructor.

COSC 301 Construction Surveying
Credits 2.0 Lecture Hours. 3 Lab Hours.
Practical applications of surveying to the practice of construction project management; distance, grade and angular measurement; surveying equipment and its application to construction layout and control; surveying documentation and field work; introduction to other three dimensional measurement and positioning systems.
Prerequisite: Admission to upper level in Construction Science.

COSC 321 Structural Systems I
Credits 3.3 Lecture Hours.
Introduction to the physical principles that govern classical statics and strengths of materials through the design of architectural structures.
Prerequisite: Admission to upper level in Construction Science.

COSC 323 Soils in Construction
Credits 2.1 Lecture Hour. 3 Lab Hours.
Introduction to soils as used in construction projects; engineering properties, soil classification, soil exploration, embankment control, dewatering, excavation supports, foundations.
Prerequisite: Admission to upper level in Construction Science.

COSC 325 Mechanical, Electrical and Plumbing Systems in Construction I
Credits 3.3 Lecture Hours.
Design, operation, materials and installation methods of mechanical, electrical and plumbing systems in construction.
Prerequisite: Admission to upper level in Construction Science.

COSC 326 Mechanical, Electrical and Plumbing Systems in Construction II
Credits 3.3 Lecture Hours.
In depth coverage of mechanical, electrical and plumbing (MEP) system operations, materials and installation methods; development of MEP drawings, specifications and contract documents as used in MEP specialty contracting industry.
Prerequisite: COSC 325.
COSC 351 Construction Equipment and Methods  
Credits 3. 3 Lecture Hours.  
Management principles of construction equipment selection, operation and safety; development of skills necessary to select an equipment mix that yields maximum productivity and best value.  
Prerequisite: COSC 323.

COSC 353 Construction Project Management  
Credits 3. 3 Lecture Hours.  
An introduction to construction project management covering concepts of project selection, estimating bidding, scheduling, subcontracting practices, cost controls, project documentation, construction bonds, insurance, payments and the elements of close out; development of professional communication skills through prepared multi-media presentations.  
Prerequisite: Admission to upper level in Construction Science.

COSC 364 Construction Safety I  
Credit 1. 1 Lecture Hour.  
Administration and application of the OSHA Act in the construction industry; includes standards, the general duty clause, competent person, and hazard identification; fulfills the requirements for the ten-hour OSHA certifications.  
Prerequisite: Admission to upper level in Construction Science.

COSC 375 Estimating II  
Credits 3. 2 Lecture Hours.  3 Lab Hours.  
Quantification and pricing of direct field costs and general condition costs from construction documents; the preparation of complete lump sum bid package ready for project execution; complete set of contract documents required.  
Prerequisites: Admission to upper level in Construction Science; COSC 275.

COSC 381 Professional Ethics in the Construction Industry  
Credit 1. 1 Lecture Hour.  
Principles of ethical behavior in preparation for a professional internship with a construction or construction-related company; various construction company case studies emphasizing: personal accountability, integrity, moral courage, individual, association and company codes of conduct; accepted business practices, decision making, company cultures, peer pressure, public opinion.  
Prerequisite: Admission to upper level in Construction Science.

COSC 421 Soil and Structural Analysis  
Credits 3. 3 Lecture Hours.  
Advanced structural analysis of steel and concrete members with an introduction to soil properties and constituents; utilizations of computer analysis tools.  
Prerequisite: COSC 321.

COSC 422 Structural Systems III  
Credits 3. 3 Lecture Hours.  
Structural principles applied to the design and construction of architectural reinforced concrete structures, reinforced masonry structures, and other selected topics.  
Prerequisite: COSC 421.

COSC 440 Interdisciplinary Capstone  
Credits 4. 4 Lecture Hours.  
A senior capstone for students preparing to enter the design/build sector of the construction industry; integration of the design and construction processes into a single, cohesive project delivery system, starting with project inception, and carrying through construction, operation and maintenance of various types of construction projects.  
Prerequisites: COSC 475; must be taken last full semester or summer before graduation.

COSC 441 Residential Capstone  
Credits 4. 4 Lecture Hours.  
A senior capstone course for students preparing to enter the residential construction industry; project management of residential projects, including: market analysis, site analysis, residential design, building codes, estimating, scheduling, financing, subcontracting, marketing, business planning and current trends in design and construction.  
Prerequisites: COSC 475; must be taken last full semester or summer before graduation.

COSC 442 Commercial Capstone  
Credits 4. 4 Lecture Hours.  
A senior capstone course for students preparing to enter the commercial construction sector; project management of commercial construction projects, including: aspects of design, bidding/estimating, Presentation, value engineering, contracts/negotiation, subcontractor relations, cost controls, management during construction, close out, and post-construction requirements.  
Prerequisites: COSC 475; must be taken last full semester or summer before graduation.

COSC 443 Industrial Capstone  
Credits 4. 4 Lecture Hours.  
A senior capstone course for students preparing to enter the industrial construction sector; project management of industrial construction projects including: project acquisition, planning and staffing, engineering, procurement, construction, start-up, close out, operations and maintenance, and turn-arounds.  
Prerequisites: COSC 475; must be taken last full semester or summer before graduation.

COSC 446 Specialty Capstone  
Credits 4. 4 Lecture Hours.  
Senior capstone course for students preparing to enter the mechanical, electrical or other specialty construction company; project management of specialty contracts, including: project acquisition, schematic system design, estimating/bidding, scheduling, systems integration, value engineering, management during construction of crews and procurement, contract administration, business planning and current industry issues.  
Prerequisites: COSC 475; must be taken last full semester or summer before graduation.

COSC 450 Facility Management Principles and Practices  
Credits 3. 3 Lecture Hours.  
Principles of facility management; the life cycle of a project; strategic planning; performance measurements; life cycle cost approach; building sustainability; maintenance management; and industry practices.  
Prerequisite: Admission to upper level in Construction Science.

COSC 459 Industrial Construction  
Credits 3. 3 Lecture Hours.  
Industry specific knowledge such as concepts of developing construction management strategies of industrial projects, materials and methods, structural and mechanical components; preparation to effectively resolve challenges faced in the industrial construction sector.  
Prerequisites: Admission to upper level in Construction Science; COSC 375.

COSC 461 Building Information Modeling System  
Credits 3. 3 Lecture Hours.  
Exploration of a data-rich, object-oriented, and parametric digital representation of the facility, from which views and information can be extracted and analyzed for construction project acquisition, planning, and control.  
Prerequisite: Admission to upper level in Construction Science.
COSC 463 Introduction to Construction Law
Credits 3. 3 Lecture Hours.
Introduction to basic contract and tort issues and their application in the construction industry; delineation of the various types of contracts and remedies available to parties involved in a construction project; additional related topics including bidding, delays, mechanics liens, site conditions, warranties and the Uniform Commercial Code as it relates to the construction industry, introduction to legal research and reasoning as used by professional constructors.
Prerequisite: Admission to upper level in Construction Science.

COSC 464 Construction Safety II
Credits 3. 3 Lecture Hours.
Administration and application of the Occupational Safety and Health Administration Act in the construction industry; includes: OSHA standards, the general duty clause, competent person, and hazard identification; fulfills the requirements for the thirty-hour OSHA, CPR and First Aid certifications.
Prerequisite: Admission to upper-level in Construction Science.

COSC 465 Advanced Topics in Construction Law
Credits 3. 3 Lecture Hours.
Legal issues affecting construction, including the parties to construction work, contracting, responsibilities and risk, risk management, damages, handling of claims and disputes, indemnification, bonds, insurance, bankruptcy, labor and employment, and subcontract management; litigation and alternative dispute resolution methods regularly used in the construction industry.
Prerequisite: COSC 463.

COSC 468 Risk Management in the Built Environment
Credits 3. 3 Lecture Hours.
Decision-making and risk analysis concepts in the context of the built environment and construction projects; major categories and tools of risk management regularly used in the construction industry such as contracts, insurance and bonds.
Prerequisites: Admission to upper level in construction science and COSC 463 or concurrent enrollment.

COSC 474 Facility Management Summer Internship
Credits 3. 3 Lecture Hours.
Summer internship (10 weeks, 400 hours) in a facility management related position that exposes the student to facility management activities; daily logs, monthly reports, final report and completion letter required; distance education off-campus course. May not be enrolled in any other TAMU courses while enrolled in COSC 474.
Prerequisites: COSC 450; approval of internship faculty coordinator.

COSC 475 Construction Project Planning
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Development of parameter cost estimates for activities that relate to the construction of a building project; work packages sequenced, planned and leveled to develop a working project execution document; development of procedures to monitor actual field progress.
Prerequisite: COSC 353, COSC 375.

COSC 477 Construction Project Controls
Credits 3. 3 Lecture Hours.
Introduction to construction related financial documents including: schedule of values, labor and operations cost reports, income statements, balance sheets and construction budgets; emphasis on the development of techniques required to effectively monitor the financial aspects of a construction project.
Prerequisite: COSC 353.

COSC 481 Seminar
Credit 1. 1 Lecture Hour.
Seminar discussion of construction equipment selection, utilization maintenance and operating cost.
Prerequisite: Must be taken last full semester before graduation.

COSC 483 Construction Industry Contemporary Issues
Credit 1. 1 Lecture Hour.
Introduces graduating seniors to contemporary issues in the construction industry.
Prerequisite: Must be taken last full semester before graduation.

COSC 484 Summer Internship
Credits 3. 3 Other Hours.
Summer internship (10 weeks, 400 hours) with a construction or construction-related company that exposes the student to construction-related activities; daily logs, monthly reports, final report and completion letter required; distance education course with non-resident status. No other TAMU courses may be taken while enrolled in COSC 484.
Prerequisites: COSC 364 and COSC 381; approval of internship faculty coordinator.

COSC 485 Directed Studies
Credits 1 to 5. 1 to 5 Other Hours.
Special problems in building construction.
Prerequisite: Admission to upper-level in Construction Science.

COSC 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified field of construction science. May be repeated for credit.
Prerequisite: Admission to upper-level in Construction Science.

COSC 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in construction science. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Admission to upper level in Construction Science and approval of instructor.

COSC 494 Internship
Credits 7. 7 Other Hours.
An internship (15 weeks, 600 hours) with a construction or construction-related company that exposes the student to construction-related activities, daily logs, monthly reports, final report and completion letter required; distance education course with non-resident status. No other TAMU courses may be taken while enrolled in COSC 494.
Prerequisites: COSC 364 and COSC 381; approval of internship faculty coordinator.

COSC 601 Construction Practices
Credits 3. 3 Lecture Hours.
Materials and methods of construction with emphasis on the design and construction process; includes structural steel and other metals, foundation materials, precast and tilt wall concrete, concrete reinforcement including pre-stressing, wood dimension lumber framing, and heavy timber framing.
COSC 602 Construction Cost Estimating
Credits 3.3 Lecture Hours.
Determination of quantities for various types of construction materials and works including earthwork, foundations, structural systems, mechanical and electrical systems, and building finishes; methods used for pricing of construction works including labor, materials, equipment, sub-contractors, overhead and profit; use of various types of cost data catalogs available in the industry.

COSC 603 Construction Scheduling
Credits 3.3 Lecture Hours.
Introduction to commonly used techniques and computer applications for the planning, scheduling, monitoring, and controlling of construction projects; includes key scheduling techniques such as Gantt Chart, CPM, PERT, LSM, and EVM; practical scheduling practices such as tracking, controlling, and forecasting trends of schedules, cost control, and reporting.
Prerequisite: COSC 602 or equivalent.

COSC 606 Mechanical and Electrical Construction
Credits 3.3 Lecture Hours.
Building environmental systems with a major emphasis on the design and control of the heating, ventilation and cooling systems, plumbing and drainage systems, electrical, fire and lightning protection, and lighting; design opportunities, calculations, equipment selection and economics as they relate to design and construction.

COSC 608 Structural Principles and Practices
Credits 3.3 Lecture Hours.
Investigations into practical applications of structural design including the analysis and design of structural members in steel and concrete; surveys and studies of various structural systems.

COSC 620 Construction Company Operations
Credits 3.3 Lecture Hours.
Running a construction company; strategic planning; business planning; organizational theory; competitor analysis; risk management; financial analysis; human resources; management information systems; leadership; codes of ethics; best practices.

COSC 621 Advanced Project Management
Credits 3.3 Lecture Hours.
Theoretical, practical, and strategic development in the management of contemporary construction projects; advanced techniques used in scheduling and evaluating progress in construction project control; exploration of state-of-the-art management principles and practices, and development of additional insights.
Prerequisite: COSC 603 or COSC 475.

COSC 622 Construction Economics
Credits 3.3 Lecture Hours.
Foundation in Life Cycle Cost Analysis computation within the context of current issues in environmental sustainability and evidence-based thinking; lean construction as a strategy to overcome the hurdle of first cost.

COSC 624 Construction Business Development
Credits 3.3 Lecture Hours.
Acquisition of new work in the construction industry; understanding available project delivery systems; competitor analyses; acquisition procedures including response techniques for complex requests for proposals; understanding concepts of sales and marketing, branding, backlog, and business development budgeting in construction.

COSC 628 Construction Contracts and Risk Management
Credits 3.3 Lecture Hours.
Advanced construction law, contracts, and risk management applicable to construction management; identification of common disputes and construction risks among the owner, design professionals, and contractor; analysis of construction contracts with an emphasis on troublesome provisions and solutions; demonstration of tools of negotiation and dispute resolution; ethics in construction.

COSC 631 Advanced Productivity and Lean
Credits 3.3 Lecture Hours.
Introduction to lean history, concepts and methods; deduction of basic training modules in lean project delivery; application of lean management in construction projects.

COSC 642 Construction Information Technology
Credits 3.3 Lecture Hours.
Exploration of emerging technologies for the construction industry including hardware and software systems such as BIM, RFID, Wireless/Mobile, information systems, construction specific programs, and information strategy planning; using information strategy planning by owners and contractors to effectively enhance the management of business entities and projects in construction.

COSC 644 Advanced Construction Systems
Credits 3.3 Lecture Hours.
Theoretical, practical, and strategic development in contemporary construction systems; exploration of state-of-the-art innovations in environmental control systems, structural principles and practices; integration of innovations with information technologies, and development of additional insights.

COSC 648 Graduate Capstone
Credits 3.3 Lecture Hours.
For students preparing to enter the construction industry; project and program management of construction projects; winning new work; construction company creation, operations and change accommodation; leadership and management; risk management; managing people; using technology considering the environment; and the application of lean and target value construction.

COSC 650 Advanced Construction Visualization
Credits 3.3 Lecture Hours.
Introduction to the theory and application of 3-D computer models in the design/build construction process; creation, positioning in 3-D space, and linking of building components to a database record; creation of a wide range of construction related information useful in controlling project quality.

COSC 663 Sustainable Construction
Credits 3.3 Lecture Hours.
Contribution of materials and methods to meeting the needs of the present without compromising the ability of future generations to meet their own needs; overview of international, national and local programs promoting sustainable construction; characteristics of the components of successful sustainable construction projects; theories and practices through case studies.

COSC 670 Facilities Asset Management
Credits 3.3 Lecture Hours.
Fundamentals of facility asset management and property management including concepts, theories, and principles of design, construction, accounting, finance, and management of the built environment; an overview of a project throughout its entire life cycle from various perspectives including the owner, users, designers, constructors and facility management personnel.
Prerequisite: Graduate classification.

COSC 684 Professional Internship
Credits 3 to 6. 3 to 3 Other Hours.
Approximately 400-600 hours with a construction or construction-related company that exposes the student to construction-related activities; an initial report, monthly progress reports, a final report, and a final completion letter are required.
Prerequisites: Graduate classification; approval of graduate coordinator; approval of internship coordinator.

COSC 685 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Individual problems in the area of building construction involving the application of theory and practice.
Prerequisite: Approval of instructor.

COSC 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified field of construction management. May be repeated for credit.
Prerequisite: Approval of instructor.

COSC 690 Theory of Research in Construction Management
Credits 3. 3 Lecture Hours.
Introduction to research, research tools, proposal writing and research reports; emphasis on research planning and design, conducting a comprehensive review of literature, quantitative and qualitative research methodologies, defining research problems in construction science, and the development of research proposals.
Prerequisite: STAT 651 or concurrent enrollment.

COSC 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research for thesis.
Prerequisites: COSC 690 or concurrent enrollment; approval of graduate coordinator.

COSC 693 Professional Study
Credits 1 to 6. 1 to 6 Other Hours.
Approved professional study of project undertaken as terminal requirement for Master of Science, non-thesis option. Preparation of a record of study summarizing the rationale, procedure and results of the completed study. May be repeated for credit.
Prerequisite: COSC 690 or concurrent enrollment; approval of graduate coordinator.

CSCE 681 Seminar
Credit 1. 1 Lecture Hour.
Discussion and review of degree requirements, career opportunities, and current research activities in construction management.
Prerequisite: Graduate classification.

CSCE 684 Professional Internship
Credits 3 to 6. 3 to 3 Other Hours.
Approximately 400-600 hours with a construction or construction-related company that exposes the student to construction-related activities; an initial report, monthly progress reports, a final report, and a final completion letter are required.
Prerequisites: Graduate classification; approval of graduate coordinator; approval of internship coordinator.

CSCE 685 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Individual problems in the area of building construction involving the application of theory and practice.
Prerequisite: Approval of instructor.

CSCE 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified field of construction management. May be repeated for credit.
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Prerequisite: COSC 690 or concurrent enrollment; approval of graduate coordinator.

CSCE 690 Theory of Research in Construction Management
Credits 3. 3 Lecture Hours.
Introduction to research, research tools, proposal writing and research reports; emphasis on research planning and design, conducting a comprehensive review of literature, quantitative and qualitative research methodologies, defining research problems in construction science, and the development of research proposals.
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Credits 1 to 23. 1 to 23 Other Hours.
Research for thesis.
Prerequisites: COSC 690 or concurrent enrollment; approval of graduate coordinator.

CSCE 693 Professional Study
Credits 1 to 6. 1 to 6 Other Hours.
Approved professional study of project undertaken as terminal requirement for Master of Science, non-thesis option. Preparation of a record of study summarizing the rationale, procedure and results of the completed study. May be repeated for credit.
Prerequisite: COSC 690 or concurrent enrollment; approval of graduate coordinator.

CSCE 111 Introduction to Computer Science Concepts and Programming
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Computation to enhance problem solving abilities; understanding how people communicate with computers, and how computing affects society; computational thinking; software design principles, including algorithm design, data representation, abstraction, modularity, structured and object oriented programming, documentation, testing, portability, and maintenance; understanding programs' abilities and limitations; development and execution programs.

CSCE 113 Intermediate Programming and Design
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Continuation of ENGR 112; programming and design with C++; topics include design and implementation of functions, classes, and class hierarchies; software development strategies; error handling and exceptions; testing and debugging; type safety; strings; templates and the STL; graphics and GUIs; mathematical computation; and principles of object-oriented programming.
Prerequisites: Knowledge of C++ programming, class design, portable graphics, and parameterized types and their implementations.

CSCE 121 Introduction to Program Design and Concepts
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Computation to enhance problem solving abilities; computational thinking; understanding how people communicate with computers, how computing affects society; design and implementation of algorithms; data types, program control, iteration, functions, classes, and exceptions; understanding abstraction, modularity, code reuse, debugging, maintenance, and other aspects of software development; development and execution of programs.
Prerequisite: Programming course (high school or college).

CSCE 181 Introduction to Computing
Credit 1. 1 Lecture Hour.
Introduction to the broad field of computing; presentations from industry and academia about how computer science concepts are used in research and end products; includes a major writing component.

CSCE 206 Structured Programming in C
Credits 4. 3 Lecture Hours. 2 Lab Hours.
(BCIS 1420, COSC 1420) Structured Programming in C. Basic concepts, nomenclature and historical perspective of computers and computing; internal representation of data; software design principles and practice; structured and object-oriented programming in C; use of terminals, operation of editors and executions of student-written programs.

CSCE 211 Introduction to Computer Science Concepts and Programming
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Computation to enhance problem solving abilities; understanding how people communicate with computers, and how computing affects society; computational thinking; software design principles, including algorithm design, data representation, abstraction, modularity, structured and object oriented programming, documentation, testing, portability, and maintenance; understanding programs' abilities and limitations; development and execution programs.

CSCE 221 Data Structures and Algorithms
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Specification and implementation of basic abstract data types and their associated algorithms: stacks, queues, lists, sorting and selection, searching, graphs, and hashing; performance tradeoffs of different implementations and asymptotic analysis of running time and memory usage; includes the execution of student programs written in C++.
Prerequisite: CSCE 113 or CSCE 121.
Corequisite: CSCE 222/ECEN 222.

CSCE 222/ECEN 222 Discrete Structures for Computing
Credits 3. 3 Lecture Hours.
Provide mathematical foundations from discrete mathematics for analyzing computer algorithms, for both correctness and performance; introduction to models of computation, including finite state machines and Turing machines.
Prerequisite: MATH 151.
Cross Listing: ECEN 222/CSC 222.
CSCE 285 Directed Studies
Credits 1 to 4. 1 to 4 Lecture Hours.
Special project in computer science. Project must be approved by the department.
Prerequisite: Approval of department head.

CSCE 289 Special Topics in...
Credit 1. 1 Lecture Hour.
Selected topics in an identified area of computer science. May be repeated for credit.
Prerequisite: Approval of instructor.

CSCE 291 Research
Credits 1 to 4. 1 to 4 Lecture Hours.
Research conducted under the direction of faculty member in computer science. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

CSCE 310 Database Systems
Credits 3. 3 Lecture Hours.
File structures and access methods; database modeling, design and user interface; components of database management systems; information storage and retrieval, query languages, high-level language interface with database systems.
Prerequisites: CSCE 221 with a grade of C or better; junior or senior classification.

CSCE 312 Computer Organization
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Introduction to computer systems from programmer's perspective: simple logic design, data representation and processor architecture, programming of processors, memory, control flow, input/output, and performance measurements; hands-on lab assignments.
Prerequisites: CSCE 221 with a grade of C or better; junior or senior classification or approval of instructor.

CSCE 313 Introduction to Computer Systems
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Introduction to system support for application programs, both on single node and over network: OS application interface, inter-process communication, introduction to system and network programming, and simple computer security concepts; hands-on lab assignments.
Prerequisite: CSCE 221 with a grade of C or better; CSCE 312 or corequisite CSCE 350/ECEN 350.

CSCE 314 Programming Languages
Credits 3. 3 Lecture Hours.
Explores the design space of programming languages via an in-depth study of two programming languages, one subject-oriented (Java), one functional (Haskell); focuses on idiomatic uses of each language, and on features characteristic for each language.
Prerequisites: CSCE 221 with grade of C or better; junior or senior classification or approval of instructor.

CSCE 315 Programming Studio
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Intensive programming experience that integrates core concepts in Computer Science and familiarizes with a variety of programming/development tools and techniques; students work on 2 or 3 month-long projects each emphasizing a different specialization within Computer Science; focuses on programming techniques to ease code integration, reusability, and clarity.
Prerequisites: CSCE 312 and CSCE 314; or CSCE 350/ECEN 350.
Corequisite: CSCE 313.

CSCE 350/ECEN 350 Computer Architecture and Design
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Computer architecture and design; use of register transfer languages and simulation tools to describe and simulate computer operations; central processing unit organization; microprogramming; input/output and memory system architectures.
Prerequisites: ECEN 248 with a grade of C or better; junior or senior classification.
Cross Listing: ECEN 350/CSCE 350.

CSCE 410 Operating Systems
Credits 3. 3 Lecture Hours.
Hardware/software evolution leading to contemporary operating systems; basic operating systems concepts; methods of operating systems design and construction; algorithms for CPU scheduling, memory and general resource allocation, process coordination and management; case studies of several operating systems.
Prerequisites: CSCE 313 and CSCE 315.

CSCE 411 Design and Analysis of Algorithms
Credits 3. 3 Lecture Hours.
Study of computer algorithms for numeric and non-numeric problems; design paradigms; analysis of time and space requirements of algorithms; correctness of algorithms; NP-completeness and undecidability of problems.
Prerequisite: Grade of C or better in CSCE 221 and CSCE 222/ECEN 222; junior or senior classification or approval of instructor.

CSCE 420 Artificial Intelligence
Credits 3. 3 Lecture Hours.
Fundamental concepts and techniques of intelligent systems; representation and interpretation of knowledge on a computer; search strategies and control; active research areas and applications such as notational systems, natural language understanding, vision systems, planning algorithms, intelligent agents and expert systems.
Prerequisite: CSCE 315 or approval of instructor.

CSCE 431 Software Engineering
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Application of engineering approach to computer software design and development; life cycle models, software requirements and specification; conceptual model design; detailed design; validation and verification; design quality assurance; software design/development environments and project management.
Prerequisite: CSCE 315 or approval of instructor.

CSCE 433 Formal Languages and Automata
Credits 3. 3 Lecture Hours.
Basic types of abstract languages and their acceptors; the Chomsky hierarchy; solvability and recursive function theory; application of theoretical results to practical problems.
Prerequisite: CSCE 315 or approval of instructor.

CSCE 434 Compiler Design
Credits 3. 3 Lecture Hours.
Programming language translation: functions and general organization of compiler design and interpreters; theoretical and implementation aspects of lexical scanners; parsing of context free languages; code generation and optimization; error recovery.
Prerequisite: CSCE 315 or approval of instructor.
CSCE 435 Parallel Computing  
**Credits 3.3 Lecture Hours.**  
Overview of parallel computing technology and programming methods; includes multiprocessor architectures, programming tools, parallel performance, parallel algorithms, and applications of parallel computing.  
**Prerequisites:** CSCE 315 and junior or senior classification or approval of instructor.

CSCE 436 Computer-Human Interaction  
**Credits 3.3 Lecture Hours.**  
Comprehensive study of the Computer-Human Interaction (CHI) area; includes history and importance of CHI; CHI design theories; modeling of computer users and interfaces; empirical techniques for task analysis and interface design; styles of interaction and future directions of CHI including hypermedia and computer-supported collaborative work.  
**Prerequisite:** CSCE 315 or approval of instructor.

CSCE 438 Distributed Objects Programming  
**Credits 3.3 Lecture Hours.**  
Principles of distributed computing and programming with current paradigms, protocols, and application programming interfaces including Sockets, RMI, CORBA, IDL, Servlets, Web Services; security issues with public/private keys, digital signatures, forms and GUI based applications with multi-tier components, database connectivity and storing/streaming data structured using XML.  
**Prerequisite:** CSCE 315 or approval of instructor.

CSCE 440 Quantum Algorithms  
**Credits 3.3 Lecture Hours.**  
Introduction to the design and analysis of quantum algorithms; basic principles of the quantum circuit model; gives a gentle introduction to basic quantum algorithms; reviews recent results in quantum information processing.  
**Prerequisite:** CSCE 315 or approval of instructor.

CSCE 441 Computer Graphics  
**Credits 3.3 Lecture Hours.**  
Principles of interactive computer graphics; 2-D and 3-D rendering pipelines, including geometric object and view transformations, projections, hidden surface removal, and rasterization; lighting models for local and global illumination; hierarchical models of 3-D objects; systems and libraries supporting display and user interaction.  
**Prerequisite:** CSCE 315 or approval of instructor.

CSCE 442 Scientific Programming  
**Credits 3.3 Lecture Hours.**  
Introduction to numerical algorithms fundamental to scientific and engineering applications of computers; elementary discussion of error; algorithms, efficiency; polynomial approximations, quadrature and systems of algebraic and differential equations.  
**Prerequisites:** CSCE 221 with a grade of C or better; MATH 304 or MATH 308 or concurrent enrollment.

CSCE 443/VIST 487 Game Development  
**Credits 3.2 Lecture Hours. 2 Lab Hours.**  
Aesthetic and technical aspects of computer game development, including game mechanics, story development, content creation and game programming; includes game design, interface design, 3D modeling and animation, graphics algorithms, shader programming and artificial intelligence; group project includes the design and development of a game from start to finish.  
**Prerequisites:** CSCE 441 or VIST 486 or approval of instructor.  
**Cross Listing:** VIST 487.

CSCE 444 Structures of Interactive Information  
**Credits 3.3 Lecture Hours.**  
A systems approach to the programming, design, authoring and theory of hypermedia; object-oriented visual and interactive programming; visual design, including color, space, text and layering; the reference as a metadisciplinary structure; collecting and sampling; ontologies, maps and navigation as means of structuring information; create dynamic hypermedia that is expressive and interpretive.  
**Prerequisite:** CSCE 315 or approval of instructor.

CSCE 445 Computers and New Media  
**Credits 3.3 Lecture Hours.**  
Potential and realized impact of computers in the design of new media; relationship between authors and readers of interactive material; influence of media design on the content expressed.  
**Prerequisite:** CSCE 221 or approval of instructor.

CSCE 452 Robotics and Spatial Intelligence  
**Credits 3.3 Lecture Hours.**  
Algorithms for executing spatial tasks; path planning and obstacle aance in two- and three-dimensional robots—configuration space, potential field, free-space decomposition methods; stable grasping and manipulation; dealing with uncertainty; knowledge representation for planning—geometric and symbolic models of the environment; task-level programming; learning.  
**Prerequisite:** CSCE 315 or approval of instructor.

CSCE 456 Real-Time Computing  
**Credits 4.3 Lecture Hours. 3 Lab Hours.**  
Introduction to principles and applications of real-time computing; system architecture; D/A and A/D conversion; synchronous data acquisition and analysis; computers in real-time control; asynchronous monitoring and control; resource scheduling; interfacing issues; lectures and laboratory.  
**Prerequisites:** CSCE 313 and MATH 152.

CSCE 462 Microcomputer Systems  
**Credits 3.2 Lecture Hours. 1 Lab Hour.**  
Microcomputers as components of systems; VLSI processor and coprocessor architectures, addressing and instruction sets; I/O interfaces and supervisory control; VLSI architectures for signal processing; integrating special purpose processors into a system.  
**Prerequisite:** CSCE 313.

CSCE 463 Networks and Distributed Processing  
**Credits 3.3 Lecture Hours.**  
Basic hardware/software, architectural components for computer communications; computer networks, switching, routing, protocols and security; multiprocessing and distributed processing; interfacing operating systems and networks; case studies of existing networks and network architectures.  
**Prerequisite:** CSCE 315 or approval of instructor.

CSCE 464 Wireless and Mobile Systems  
**Credits 3.3 Lecture Hours.**  
Introduction to wireless and mobile systems; wireless communication fundamentals; wireless medium access control design; transmission scheduling, network and transport protocols over wireless design, simulation and evaluation; wireless capacity; telecommunication systems; vehicular, adhoc, and sensor network systems; wireless security; mobile applications.  
**Prerequisites:** CSCE 313; junior or senior classification or approval of instructor.
CSCE 465 Computer and Network Security
Credits 3. 3 Lecture Hours.
Fundamental concepts and principles of computer security, operating
system and network security, secret key and public key cryptographic
algorithms, hash functions, authentication, firewalls and intrusion detection
systems, IPSec and VPN, wireless and web security.
Prerequisites: CSCE 313 and CSCE 315; junior or senior classification;
or approval of instructor.

CSCE 469 Advanced Computer Architecture
Credits 3. 3 Lecture Hours.
Introduction to advanced computer architectures including memory
designs, pipeline techniques, and parallel structures such as vector
computers and multiprocessors.
Prerequisite: ECEN 350/CSCE 350.

CSCE 470 Information Storage and Retrieval
Credits 3. 3 Lecture Hours.
Representation of, storage of and access to very large multimedia
document collections; fundamental data structures and algorithms of
current information storage and retrieval systems and relates various
techniques to design and evaluation of complete retrieval systems.
Prerequisite: CSCE 315 or approval of instructor.

CSCE 481 Seminar
Credit 1. 2 Lab Hours.
Investigation and report by students on topics of current interest in
computer science.
Prerequisite: Junior or senior classification.

CSCE 482 Senior Capstone Design
Credits 3. 1 Lecture Hour. 6 Lab Hours.
Project-based course to develop system integration skills for solving
real-world problems in computer science; significant team software
project that integrates advanced concepts across computer science
specializations; projects require design, implementation, documentation
and demonstration, as well as design methodology, management process
and teamwork.
Prerequisites: Senior classification; CSCE 315, CSCE 411, and two
additional CSCE tracked courses.

CSCE 483 Computer Systems Design
Credits 3. 1 Lecture Hour. 6 Lab Hours.
Engineering design; working as a design-team member, conceptual
design methodology, design evaluations, total project planning and
management techniques, design optimization, systems manufacturing
costs considerations; emphasis placed upon students’ activities as design
professionals.
Prerequisites: CSCE 315 and CSCE 462; senior classification.

CSCE 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Permits work on special project in computer science. Project must be
approved by the department.
Prerequisite: Senior classification.

CSCE 489 Special Topics in...
Credits 1 to 4. 0 to 4 Lecture Hours. 0 to 4 Lab Hours.
Special topics in computer science that are new or unique that are not
covered in existing courses.

CSCE 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in the
computer science. May be repeated 2 times for credit. Registration
in multiple sections of this course is possible within a given semester
provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor.

CSCE 601 Programming with C and Java
Credits 3. 3 Lecture Hours.
Survey of the C and Java programming languages, including principles of
procedural and object-oriented languages; multi-disciplinary applications
including business, Internet and engineering problems.
Prerequisite: Graduate classification.

CSCE 602 Object-Oriented Programming, Development and Software
Engineering
Credits 3. 3 Lecture Hours.
Teaches Object-Oriented Programming in C++; software engineering
principles presented to teach how to build high quality software;
semester project gives quasi-real-world experience with issues such as
requirements capture and object-orient development.
Prerequisites: CSCE 601 or approval of instructor; graduate
classification.

CSCE 603 Database Systems and Applications
Credits 3. 3 Lecture Hours.
Introduction to the concepts and design methodologies of database
systems for non-computer science majors; emphasis on E. F. Codd's
relational model with hands-on design application. No credit will be given
for both CSCE 310 and CSCE 603.
Prerequisites: CSCE 601; graduate classification.

CSCE 604 Programming Languages
Credits 3. 3 Lecture Hours.
Study in the design space of programming languages, covering language
processing, formalisms to describe semantics of programming languages,
important concepts found in current programming languages, and
programming paradigms.
Prerequisite: Graduate classification.

CSCE 605 Compiler Design
Credits 3. 3 Lecture Hours.
Advanced topics in compiler writing; parser generators and compiler-
compilers; dynamic storage and scope resolution; data flow analysis and
code optimization.
Prerequisite: CSCE 434.

CSCE 606 Software Engineering
Credits 3. 3 Lecture Hours.
Development of advanced concepts in software engineering; software
development environments as a mechanism for enhancing productivity
and software quality; the classification, evaluation and selection of
methodologies for environments; rapid prototyping and reusability
concepts; artificial intelligence techniques applied to software engineering.
Prerequisite: CSCE 431 or approval of instructor.

CSCE 608 Database Systems
Credits 3. 3 Lecture Hours.
Database modeling techniques; expressiveness in query languages
including knowledge representation; manipulation languages data models;
physical data organization; relational database design theory; query
processing; transaction management and recovery; distributed data
management.
Prerequisite: CSCE 310 or CSCE 603.
CSCE 610 Hypertext/Hypermedia Systems
Credits 3.3 Lecture Hours.
Comprehensive coverage of Hypertext/Hypermedia; basic concepts and definitions; fundamental components, architectures and models; problems and current solutions; design and implementation issues; and research issues.
Prerequisites: CSCE 310 or CSCE 603; CSCE 313.

CSCE 611 Operating Systems and Applications
Credits 3.3 Lecture Hours.
Review of computer architecture hardware/software evolution leading to contemporary operating systems; basic operating systems concepts; methods of operating systems design and construction; algorithms for CPU scheduling memory and general resource allocation; process coordination and management; case studies of several operating systems; quality-of-services of operating systems and their impact on applications. No credit will be given for both CSCE 410 and CSCE 611.
Prerequisites: CSCE 313; graduate classification.

CSCE 612 Applied Networks and Distributed Processing
Credits 3.3 Lecture Hours.
Fundamentals, including network design and protocol analysis, in the context of computer communications; mixes fundamentals with both programming and pragmatic views of engineering issues; it includes network architecture as well as principles of network engineering; focus is on applying principles of layered architecture to analyzing real networks; lab exercises focus on protocol understanding and programming; knowledge of UNIX and C programming helpful, but not required. No credit will be given for both CSCE 463 and CSCE 612.
Prerequisite: Graduate classification.

CSCE 613 Operating Systems
Credits 3.3 Lecture Hours.
Analysis of algorithms in computer operating systems; sequencing and control algorithms supporting concurrent processes; scheduling algorithms to minimize execution times and mean flow times; algorithms for allocating tasks to processors; allocation of memory (virtual and real); direct access device schedules; auxiliary and buffer storage models.
Prerequisite: CSCE 313 or CSCE 611.

CSCE 614 Computer Architecture
Credits 3.3 Lecture Hours.
Reviews of von Neumann architecture and its limitations; parallel computer structures and concurrent computation; pipeline computers and vectorization methods; array processors, multiprocessor architectures and programming; dataflow computers.
Prerequisite: CSCE 350/ECEN 350/ECEN 350/CSCE 350.

CSCE 617 Co-Design of Embedded Systems (CODES)
Credits 3.3 Lecture Hours.
Co-design methodologies of hardware-software systems; models of computation (MOC), system specification, co-simulation, synthesis, and verification; hardware-software implementation; core-based systems and interfaces, performance analysis and optimization; system on chip, power aware design.
Prerequisites: CSCE 462 or equivalent, CSCE 410 and graduate classification.

CSCE 619 Networks and Distributed Computing
Credits 3.3 Lecture Hours.
Computer network concepts including network architecture, layering, protocols, packet switching and virtual circuits; performance evaluation and design considerations for local area networks; packet distributed networks; satellite networks.
Prerequisite: CSCE 463 or CSCE 612.

CSCE 620/VIZA 670 Computational Geometry
Credits 3.3 Lecture Hours.
Design and analysis of algorithms for solving geometrical problems; includes convex hull problems, Voronoi diagrams, range searching and proximity problems.
Prerequisite: CSCE 311.
Cross Listing: VIZA 670/CSCE 620.

CSCE 621 Language, Library, and Program Design Using C++
Credits 3.3 Lecture Hours.
Exploration of the interactions among language design, library design, and program design in the context of ISO standard C++ and its proposed extensions; Novel features provided by C++ and the design and programming techniques supported.
Prerequisites: Graduate classification or approval of instructor; understanding of C++ and experience with software development projects helpful; knowledge of at least one programming language in addition to C and C++.

CSCE 622 Generic Programming
Credits 3.3 Lecture Hours.
The generic programming approach to design and systematic classification of software components, techniques for achieving correctness, efficiency, and generality of algorithms, data structures, and memory management, methods of structuring a library of generic software components for maximum usability are practiced in a significant design and implementation project.
Prerequisite: CSCE 221.

CSCE 624 Sketch Recognition
Credits 3.3 Lecture Hours.
Analysis, implementation, and comparison of sketch recognition algorithms, including feature-based, vision-based, geometrical, timing-based, and path-based recognition algorithms. Methods for combining these recognition methods for greater accuracy, using known AI techniques, are also examined.
Prerequisite: Graduate classification.

CSCE 625 Artificial Intelligence
Credits 3.3 Lecture Hours.
Basic concepts and methods of artificial intelligence; Heuristic search procedures for general graphs; game playing strategies; resolution and rule based deduction systems; knowledge representation; reasoning with uncertainty.
Prerequisite: CSCE 221.

CSCE 626 Parallel Algorithm Design and Analysis
Credits 3.3 Lecture Hours.
Design of algorithms for use on highly parallel machines; area-time complexity of problems and general lower bound theory; application (of these concepts) to artificial intelligence, computer vision and VLSI design automation.
Prerequisite: CSCE 221.

CSCE 627 Theory of Computability
Credits 3.3 Lecture Hours.
Formal models of computation such as pushdown automata; Turing machines and recursive functions; unsolvability results; complexity of solvable results.
Prerequisite: CSCE 433.
CSCE 628/BICH 628 Computational Biology
Credits 3.3 Lecture Hours.
Introduction to computational biology; formulations of biology problems as computational problems; computational approaches to solve problems in genomics and proteomics.
Prerequisite: Graduate classification or approval of instructor.
Cross Listing: BICH 628/CSCE 628.

CSCE 629 Analysis of Algorithms
Credits 3.3 Lecture Hours.
Concrete algorithm design and analysis; abstract models to analyze the complexity of problems; NP-Completeness; approximation and probabilistic algorithms.
Prerequisite: CSCE 411.

CSCE 630 Speech Processing
Credits 3.3 Lecture Hours.
Speech production and perception (speech apparatus, articulatory/auditory phonetics); mathematical foundations (sampling, filtering, probability, pattern recognition); speech analysis and coding (short-time Fourier analysis, linear prediction, cepstrum); speech recognition (dynamic time warping, hidden Markov models, language models); speech synthesis (front-end, back-end); speech modification (overlap-add, enhancement, voice conversion).
Prerequisites: ECEN 314 or equivalent or approval of instructor. Basic knowledge of signals and systems, linear algebra, probability and statistics. Programming experience in a high-level language is required.

CSCE 631 Intelligent Agents
Credits 3.3 Lecture Hours.
On the design and implementation of Intelligent Agents and coordination mechanisms among multiple agents, ranging from theoretical principles to practical methods for implementation.
Prerequisite: CSCE 420 or CSCE 625.

CSCE 633 Machine Learning
Credits 3.3 Lecture Hours.
Machine learning is the study of self-modifying computer systems that can acquire new knowledge and improve their own performance; survey machine learning techniques, which include induction from examples, conceptual clustering, explanation-based learning, exemplar learning and analogy, discovery and genetic algorithms.
Prerequisite: CSCE 420 or CSCE 625.

CSCE 634 Intelligent User Interfaces
Credits 3.3 Lecture Hours.
Intersection of artificial intelligence and computer-human interaction: emphasis on designing and evaluating systems that learn about and adapt to their users, tasks, and environments.
Prerequisites: Graduate classification and approval of instructor.

CSCE 635 AI Robotics
Credits 3.3 Lecture Hours. 1 Lab Hour.
Introduction and survey of artificial intelligence methods for mobile robots (ground, aerial, or marine) for science and engineering majors; theory and practice of unmanned systems, focusing on biological and cognitive principles which differ from control theory formulations.

CSCE 636 Neural Networks
Credits 3.3 Lecture Hours.
Basic concepts in neural computing; functional equivalence and convergence properties of neural network models; associative memory models; associative, competitive and adaptive resonance models of adaptation and learning; selective applications of neural networks to vision, speech, motor control and planning; neural network modeling environments.
Prerequisites: MATH 304 and MATH 308 or approval of instructor.

CSCE 637 Complexity Theory
Credits 3.3 Lecture Hours.
Deterministic, non-deterministic, alternating and probabilistic computations; reducibilities; P, NP and other complexity classes; abstract complexity; time, space and parallel complexity; and relativized computation.
Prerequisite: CSCE 627 or approval of instructor.

CSCE 639/MEEN 676 Fuzzy Logic and Intelligent Systems
Credits 3.3 Lecture Hours.
Introduces the basics of fuzzy logic and its role in developing intelligent systems; topics include fuzzy set theory, fuzzy rule inference, fuzzy logic in control, fuzzy pattern recognition, neural fuzzy systems and fuzzy model identification using genetic algorithms.
Prerequisite: CSCE 625 or approval of instructor.
Cross Listing: MEEN 676/CSCE 639.

CSCE 640 Quantum Algorithms
Credits 3.3 Lecture Hours.
Introduction to the design and analysis of quantum algorithms; basic principles of the quantum circuit model; gives a gentle introduction to basic quantum algorithms; reviews recent results in quantum information processing.
Prerequisite: CSCE 629 or approval of instructor.

CSCE 641/VIZA 672 Computer Graphics
Credits 3.3 Lecture Hours.
Representations of 3-dimensional objects, including polyhedral objects, curved surfaces, volumetric representations and CSG models; techniques for hidden surface/edge removal and volume rendering; illumination and shading; anti-aliasing; ray tracing; radiosity; animation; practical experience with state-of-the-art graphics hardware and software.
Prerequisite: CSCE 441.
Cross Listing: VIZA 672/CSCE 641.

CSCE 643 Seminar in Intelligent Systems and Robotics
Credits 3.3 Lecture Hours.
Problems, methods and recent developments in intelligent systems and robotics. May be taken at multiple times for credit as content varies.
Prerequisite: Approval of instructor.

CSCE 644 Cortical Networks
Credits 3.3 Lecture Hours.
The architecture of the mammalian cerebral cortex: its modular organization and its network for distributed and parallel processing; cortical networks in perception and memory; neuronal microstructure and dynamical simulation of cortical networks; the cortical network as a proven paradigm for the design of cognitive machines.
Prerequisites: CSCE 420 or CSCE 625 and CSCE 636 and graduate classification.
CSCE 645/VIZA 675 Geometric Modeling  
Credits 3. 3 Lecture Hours.  
Geometric and solid modeling concepts. Freeform curves and surfaces (splines and Bezier) with their relational, intersectional and global mathematical properties. Parametric representation of solids, topology of closed curved surfaces, boundary concepts and Boolean/Euler operators. Construction and display of curves and surfaces, and solid models.  
Prerequisites: CSCE 441 and CSCE 442 or equivalent.  
Cross Listing: VIZA 675/CSCE 645.

CSCE 646/VIZA 654 The Digital Image  
Credits 4. 3 Lecture Hours. 2 Lab Hours.  
Tools and techniques for generation, handling and analysis of two dimensional digital images; image representation and storage; display, media conversion, painting and drawing; warping; color space operations, enhancement, filtering and manipulation.  
Prerequisite: Approval of instructor.  
Cross Listing: VIZA 656/CSCE 647.

CSCE 647/VIZA 655 Image Synthesis  
Credits 4. 3 Lecture Hours. 2 Lab Hours.  
Principles of image synthesis from 3-D scene descriptions; includes local and global illumination, shading, shadow determination, hidden surface elimination, texturing, raster graphics algorithms, transformations and projects.  
Prerequisite: Approval of instructor.  
Cross Listing: VIZA 655/CSCE 646.

CSCE 648/VIZA 657 Computer Aided Sculpting  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Mathematical and artistic principles of 3-D modeling and sculpting; includes proportions, skeletal foundation, expression and posture, line of action; curves, surfaces and volumes, interpolation and approximation, parametric and rational parametric polynomials, constructive solid geometry, and implicit representations.  
Prerequisite: Approval of instructor.  
Cross Listing: VIZA 657/CSCE 648.

CSCE 649/VIZA 659 Physically-Based Modeling  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Physical simulation as used in choreography, geometric modeling, and the creation of special effects in computer graphics: a variety of problems and techniques explored which may include particle-methods, modeling and simulation of flexible materials, kinematics and constraint systems.  
Prerequisite: Approval of instructor.  
Cross Listing: VIZA 659/CSCE 649.

CSCE 653 Computer Methods in Applied Sciences  
Credits 3. 3 Lecture Hours.  
Classical and modern techniques for the computational solution of problems of the type that traditionally arise in the natural sciences and engineering; introductions to number representation and errors, locating roots of equations, interpolation, numerical integration, linear algebraic systems, spline approximations, initial-value problems for ordinary differential equations and finite-difference methods for partial differential equations.  
Prerequisite: CSCE 442 or MATH 417; graduate classification.

CSCE 654 Supercomputing  
Credits 3. 3 Lecture Hours.  
Principles of high-performance scientific computing systems, vectorization, programming on supercomputers, numerical methods for supercomputers, performance measuring of supercomputers, multitasking.  
Prerequisite: CSCE 614.

CSCE 655 Human-Centered Computing  
Credits 3. 3 Lecture Hours.  
A foundation course in human centered systems and information; understanding and conceptualizing interaction; design and prototyping methodologies; evaluation frameworks; visual design using color, space, layering, and media; information structuring and visualization; animation and games; individual and team programming projects.  
Prerequisite: Graduate classification or CSCE 436 or 444 or approval of instructor.

CSCE 656 Computers and New Media  
Credits 3. 3 Lecture Hours.  
This class investigates the potential and realized impact of computers in the design of new media, explores the variety of relationships between authors and readers of interactive materials, and explores the influence of media design and content expressed.  
Prerequisite: Graduate classification.

CSCE 657/PETE 657 High Performance Computing for Earth Science and Petroleum Engineering  
Credits 3. 3 Lecture Hours.  
Numerical simulation of problems in Earth Sciences and Petroleum Engineering using high performance computing (HPC); development of a parallel reservoir simulator.  
Prerequisite: Graduate classification.  
Cross Listing: PETE 657/CSCE 657.

CSCE 658 Randomized Algorithms.  
Credits 3. 3 Lecture Hours.  
Introduction to randomized algorithms; selected tools and techniques from probability theory and game theory are reviewed, with a view towards algorithmic applications; the main focus is a thorough discussion of the main paradigms, techniques, and tools in the design and analysis of randomized algorithms; a detailed analysis of numerous algorithms illustrates the abstract concepts and techniques.  
Prerequisite: Graduate classification.

CSCE 659/ECEN 659 Parallel/Distributed Numerical Algorithms and Applications  
Credits 3. 3 Lecture Hours.  
A unified treatment of parallel and distributed numerical algorithms; parallel and distributed computation models, parallel computation of arithmetic expressions; fast algorithms for numerical linear algebra, partial differential equations and nonlinear optimization.  
Prerequisites: CSCE 653; MATH 304.  
Cross Listing: ECEN 659/CSCE 659.

CSCE 660/MATH 660 Computational Linear Algebra  
Credits 3. 3 Lecture Hours.  
Techniques in matrix computation: elimination methods, matrix decomposition, generalized inverses, orthogonalization and least-squares, eigenvalue problems and singular value decomposition, iterative methods and error analysis.  
Prerequisite: CSCE 442 or equivalent or MATH 417 or equivalent.  
Cross Listing: MATH 660/CSCE 660.

CSCE 661 Integrated Systems Design Automation  
Credits 3. 3 Lecture Hours.  
VLSI design systems and their levels of abstracting; algorithms for general VLSI design and implementation; computer aided design tools and principles; physical and logical models.  
Prerequisite: Graduate classification.
CSCE 662 Distributed Processing Systems
Credits 3.3 Lecture Hours.
Principles and practices of distributed processing; protocols, remote procedure calls; file sharing; reliable system design; load balancing; distributed database systems; protection and security; implementation.
Prerequisite: CSCE 313 and CSCE 463 or CSCE 612.

CSCE 663 Real-Time Systems
Credits 3.3 Lecture Hours.
Taxonomy of real-time computer systems; scheduling algorithms for static and dynamic real-time tasks; hard real-time communications protocols; programming languages and environments for real-time systems; case studies of real-time operating systems.
Prerequisites: CSCE 313, and CSCE 463 or CSCE 611, or approval of instructor.

CSCE 664 Wireless and Mobile Systems
Credits 3.3 Lecture Hours.
Wireless and mobile systems; wireless communication fundamentals; wireless medium access control design; transmission scheduling; network transport protocols over wireless design, simulation and evaluation; wireless capacity; telecommunication systems; vehicular, adhoc, and sensor network systems; wireless security; mobile applications.
Prerequisite: CSCE 463 or CSCE 464 or approval of instructor.

CSCE 665 Advanced Networking and Security
Credits 3.3 Lecture Hours.
Security aspects of various network protocols including investigation and tool development using “live” machines and networks.
Prerequisites: Graduate classification and approval of instructor.

CSCE 666 Pattern Analysis
Credits 3.3 Lecture Hours.
Introduction to methods for the analysis, classification and clustering of high dimensional data in Computer Science applications. Course contents include density and parameter estimation, linear feature extraction, feature subset selection, clustering, Bayesian and geometric classifiers, nonlinear dimensionality reduction methods from statistical learning theory and spectral graph theory, Hidden Markov models, and ensemble learning.
Prerequisites: MATH 222, MATH 411 (or equivalent) and graduate classification.

CSCE 667 Seminar in Human-Centered Computing
Credits 3.3 Lecture Hours.
Problems, methods and recent developments in human-centered computing and information. May be repeated for credit as content varies.
Prerequisite: Graduate classification.

CSCE 668 Distributed Algorithms and Systems
Credits 3.3 Lecture Hours.
Introduction to fundamental algorithmic results in distributed computing systems; leader election, mutual exclusion, consensus, logical time and causality, distributed snapshots, algorithmic fault tolerance, shared memory, clock synchronization.
Prerequisites: CSCE 411 or equivalent or approval of instructor.

CSCE 669 Computational Optimization
Credits 3.3 Lecture Hours.
Combinatorial theory of polytopes as a tool for the solution of combinatorial optimization problems; applications to max flow, matching and matroids; geometric interpretation of the results indicating the profound role that polyhedral combinatorics play in the design and complexity of approximation algorithms.
Prerequisite: CSCE 629.

CSCE 670 Information Storage and Retrieval
Credits 3.3 Lecture Hours.
Representation, storage, and access to very large multimedia document collections; fundamental data structures and algorithms of information storage and retrieval systems; techniques to design and evaluate complete retrieval systems, including cover of algorithms for indexing, compressing, and querying very large collections.
Prerequisites: CSCE 310 or CSCE 603 or approval of instructor; graduate classification.

CSCE 671 Computer-Human Interaction
Credits 3.3 Lecture Hours.
Comprehensive coverage of Computer-human Interaction (CHI) including history, importance, design theories and future direction; modeling computer users and interfaces, empirical techniques for task analysis and interface design, and styles of interaction.
Prerequisite: Graduate classification.

CSCE 672 Computer Supported Collaborative Work
Credits 3.3 Lecture Hours.
Covers design, implementation and use of technical systems that support people working cooperatively; draws from the research area of Computer Supported Cooperative Work (CSCW) and includes current theoretical, practical, technical and social issues in CSCW and future directions of the field.
Prerequisite: CSCE 671 or CSCE 610 or approval of instructor.

CSCE 675 Digital Libraries
Credits 3.3 Lecture Hours.
Surveys current research and practice in Digital Libraries, which seek to provide intellectual access to large-scale, distributed digital information repositories; current readings from the research literature which covers the breadth of this interdisciplinary area of study.
Prerequisite: Graduate classification in computer science.

CSCE 676 Testing and Diagnosis of Digital Systems
Credits 3.3 Lecture Hours.
The theory and techniques of testing VLSI-based circuits and systems, and design for testability.
Prerequisites: CSCE 321 or ECEN 350/CSCE 350 or equivalent; ECEN 220 or ECEN 248 or equivalent.

CSCE 680/ECEN 680 Testing and Diagnosis of Digital Systems
Credits 3.3 Lecture Hours.
The theory and techniques of testing VLSI-based circuits and systems, and design for testability.
Prerequisites: CSCE 321 or ECEN 350/CSCE 350 or equivalent; ECEN 220 or ECEN 248 or equivalent.

CSCE 685 Directed Studies
Credits 1 to 12.1 to 12 Other Hours.
Research problems of limited scope designed primarily to develop research technique.
CSCE 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of computer science. May be repeated for credit.
Prerequisite: Approval of instructor.

CSCE 691 Research
Credits 1 to 23. 1 to 23 Other Hours.

CVEN - Civil Engineering

Courses
CVEN 207 Introduction to the Civil Engineering Profession
Credit 1. 1 Lecture Hour.
Introduction to the study and practice of civil engineering; specialized subdisciplines of civil engineering; professionalism and professional registration; engineering ethics; exercises in engineering technical communications.
Prerequisite: ENGL 104.

CVEN 221 Engineering Mechanics: Statics
Credits 3. 2 Lecture Hours. 2 Lab Hours.
(2-2) General principles of mechanics; concurrent force systems; statics of particles; equivalent force/moment systems; centroids and center of gravity; equilibrium of rigid bodies; trusses, frames, and machines; internal forces in structural members; friction; second moments of areas.
Prerequisites: MATH 251 or MATH 253 or registration therein; PHYS 218; admitted to major degree sequence in civil engineering.

CVEN 250 Introduction to Graphics and Visualization Applications in Civil Engineering Design
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Graphical communication in the civil engineering design process; introduction to industry standard software; construction documents and contract drawings in civil engineering applications; data analysis; introduction to project visualization.

CVEN 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of civil engineering. May be repeated for credit.
Prerequisite: Approval of department head.

CVEN 301 Environmental Engineering
Credits 3. 3 Lecture Hours.
Water quality; material balances; chemical, physical and biological processes; water quality modeling; water and wastewater treatment; air quality; solid and hazardous waste management.
Prerequisites: CHEM 107; CVEN 302 or registration therein; MATH 308 or registration therein.

CVEN 302 Computer Applications in Engineering and Construction
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Application of computers to solution of civil engineering problems using various numerical methods; structured computer programming; mathematical modeling and error analysis; solution of algebraic and differential equations; numerical differentiation and integration; curve-fitting; root-finding.
Prerequisites: ENGR 112; MATH 308 or registration therein; admitted to major degree sequence in civil engineering.

CVEN 303 Civil Engineering Measurement
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Introduction to geodetic positions, datums, map projections; theory of civil engineering measurements and errors applied to horizontal and vertical control, curves, earthwork and mapping using state-of-the-art technology for data capture; processing and presentation of result.
Prerequisite: MATH 151; admitted to major degree sequence in civil engineering.

CVEN 305 Mechanics of Materials
Credits 3. 3 Lecture Hours.
Applications of conservation principles and stress/deformation relationships for continuous media to structural members; axially loaded members; thin-walled pressure vessels; torsional and flexural members; shear; moment; deflection of members; combined loadings; stability of columns; nonsymmetrical bending, shear center; indeterminate members; elastic foundations.
Prerequisite: CVEN 221.

CVEN 306 Materials Engineering for Civil Engineers
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Introduction to scientific concepts of civil engineering materials; relationship between macroscopic material properties and response and microscopic properties; physical, mechanical, surface, fracture, and rheological properties of civil engineering materials including metals, composites, and polymers.
Prerequisites: CHEM 107, PHYS 208, CVEN 221; MATH 308 or registration therein; CVEN 305 or registration therein.

CVEN 307 Transportation Engineering
Credits 3. 3 Lecture Hours.
Fundamental principles and methods in planning, design, and operation of transportation systems; driver and vehicle performance capabilities; highway geometric and pavement design principles; traffic analysis and transportation planning.
Prerequisite: CVEN 302 or registration therein.

CVEN 311 Fluid Dynamics
Credits 3. 3 Lecture Hours.
Fluid properties; statics; kinematics; basic conservation principles of continuity, energy and momentum; similitude and hydraulic models; incompressible flow in pipes; fluid dynamic drag.
Prerequisites: MATH 251 and CVEN 221; CVEN 302 or registration therein.

CVEN 315 Sensor Technology for the Built Environment
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Fundamentals of sensor technology including laboratory safety, error analysis, statistical analysis, electric circuits, data acquisition, signal conditioning, signal analysis, strain gages, laser technology, image acquisition and analysis, fiber optic sensors, wireless sensors; its applications in civil engineering; and hands-on demonstrations relevant to the natural and built environment.
Prerequisites: CVEN 302, junior or senior classification, or approval of instructor.

CVEN 322 Civil Engineering Systems
Credits 3. 3 Lecture Hours.
Economic analysis and evaluation of engineering projects; application of systems analysis to civil engineering design; systems synthesis and optimization techniques; assignments apply engineering economics, statistical methods and optimization techniques to civil engineering problems.
Prerequisite: STAT 211 or registration therein; CVEN 302 or registration therein; admitted to major degree sequence in civil engineering.
CVEN 333 Project Management for Engineers
Credits 3. 3 Lecture Hours.
Basic project management for engineering undergraduates; project development and economic justification; estimating; scheduling; network methods; critical path analysis; earned value management; recycling and rework; project organizational structures; project risk assessment; resource allocation; ethics; characteristics of project managers.
Prerequisite: Junior or senior classification in Dwight Look College of Engineering.
Cross Listing: ISEN 333 and MEEN 333.
CVEN 339 Water Resources Engineering
Credits 3. 3 Lecture Hours.
Quantitative hydrology, precipitation, hydrograph analysis, reservoir and stream routing; groundwater, Darcy equation, well equation, well design; probability concepts in design; water law; dams; reservoirs; spillways; open channel and pipe network hydraulics; pumps; urban stormwater drainage; flood damage mitigation.
Prerequisite: CVEN 311.
CVEN 342 Materials of Construction
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Physical and mechanical properties of construction materials; portland cement concrete, bituminous materials, wood, ferrous and non-ferrous metals, glass, plastics and masonry units; proportioning of concrete mixtures including admixtures.
Prerequisites: CVEN 302 or registration therein; CVEN 305 and CVEN 306; ENGL 203, ENGL 210, ENGL 241 or ENGL 301.
CVEN 343 Portland Cement Concrete Materials for Civil Engineers
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Physical and chemical characteristics of Portland cement concrete systems; constituent materials; mixture proportioning; fresh concrete characteristics; hardened concrete properties; durability characteristics; and concrete construction methods.
Prerequisites: CVEN 302 or registration therein; CVEN 305 and CVEN 306; ENGL 203, ENGL 210, ENGL 241 or ENGL 301.
CVEN 345 Theory of Structures
Credits 3. 3 Lecture Hours.
Structural engineering--functions of structure, design loads, reactions and force systems; analysis of statically determinate structures including beams, trusses and arches; energy methods of determining deflections of structures; influence lines and criteria for moving loads; analysis of statically indeterminate structures including continuous beams and frames.
Prerequisites: CVEN 302 or registration therein; CVEN 305.
CVEN 349 Civil Engineering Project Management
Credits 3. 3 Lecture Hours.
Basic elements of management of civil engineering projects; roles of all participants in the process--owners, designers, contractors and suppliers; emphasis on contractual aspect of the process--project estimating, planning and controls.
Prerequisite: CVEN 302 or registration therein; CVEN 322 or CVEN 422.
CVEN 363 Engineering Mechanics: Dynamics
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Application of first principles to model dynamic particles and rigid body systems with ordinary differential equations; solutions to models using analytical and numerical approaches; interpreting solutions/performance measures; linear vibrations; modeling of civil engineering systems and evaluating dynamic response to natural hazards.
Prerequisites: CVEN 302, CVEN 305 and MATH 308.
CVEN 365 Introduction to Geotechnical Engineering
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Physical properties of soils, classification systems, soil exploration, permeability, consolidation, compaction, and shear strength; laboratory tests conducted to determine the physical and engineering soil properties needed for application in geotechnical engineering design.
Prerequisites: CVEN 302 or registration therein; CVEN 305; ENGL 203, ENGL 210, ENGL 241 or ENGL 301.
CVEN 400 Design Problems in Civil Engineering
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Applications of civil engineering principles to the design and preparation of the plans and specifications of civil engineering projects.
Prerequisites: CVEN 303 and CVEN 345; CVEN 322 or CVEN 422; senior classification; or approval of instructor.
CVEN 402 Engineered Environmental Systems
Credits 3. 3 Lecture Hours.
Unit operations and processes in environmental engineering; physical, chemical and biological treatment of water and wastewater; treatment system analysis and design.
Prerequisite: CVEN 301.
CVEN 403 Applied Civil Engineering Surveying
Credits 2. 6 Lab Hours.
Application of land surveying principles; topographic surveying, boundary surveying, and construction staking through field exercises using state-of-the-art equipment and data capture/analysis techniques; preparation of topographic and boundary maps with related documents; presentation of results.
Prerequisites: CVEN 303; junior or senior classification.
CVEN 405 Construction Management of Field Operations
Credits 3. 3 Lecture Hours.
Effects of industrialization on construction methods and resultant construction management problems.
Prerequisite: CVEN 349.
CVEN 406 Environmental Protection and Public Health
Credits 3. 3 Lecture Hours.
Communicable and noncommunicable diseases; environmental risk assessment; environmental assessments; comprehensive environmental planning; small water and wastewater systems; solid waste management; hazardous spills and waste management; vector control; environmental administration.
Prerequisite: CVEN 301 or approval of instructor.
CVEN 413 Natural Environmental Systems
Credits 3. 3 Lecture Hours.
Water quality assessment of natural environmental systems; development and calibration of models to describe fate and transport of contaminants in aquatic systems; application of models to design of water quality control facilities.
Prerequisite: CVEN 301.
CVEN 417 Bituminous Materials
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Origin, production, specifications and tests of bituminous materials and paving mixtures used in construction and maintenance of roads and pavements, pavement surface properties, pavement distress and correction alternatives.
Prerequisites: Senior classification in engineering; CVEN 342 or CVEN 343 or approval of instructor.
CVEN 418 Highway Materials and Pavement Design  
**Credits 3. 3 Lecture Hours.**  
Theory and practice in pavement design; pavement performance; structural design of pavement layers; types of materials used in pavement layers; characterization of pavement layer materials; introduction to pavement management concepts.  
**Prerequisites:** CVEN 307; CVEN 342 or CVEN 343.

CVEN 423 Geomatics for Civil Engineering  
**Credits 3. 2 Lecture Hours. 3 Lab Hours.**  
Use of GIS, GPS, Survey and Remotely-sensed data integrated with predictive models for infrastructure management systems.  
**Prerequisite:** CVEN 303 or approval of instructor.

CVEN 424 Civil Engineering Professional Practice  
**Credits 2. 1 Lecture Hour. 2 Lab Hours.**  
Professional practice issues; current civil engineering issues that impact design, construction, and operation of the civil engineer facilities; developing engineering solutions that better serve society; business and public policy concerns; life-long learning; problem solving; professional licensure.  
**Prerequisites:** CVEN 322; senior classification in civil engineering or ocean engineering.

CVEN 435 Geotechnical Engineering Design  
**Credits 3. 2 Lecture Hours. 3 Lab Hours.**  
A design course covering prediction of settlement, analysis of the stability of slopes, prediction of bearing capacity of shallow and deep foundations and determination of earth pressures acting on retaining structures; a general course in geotechnical engineering design for undergraduates and for graduate students not primarily interested in the geotechnical field, but desiring additional study beyond the introductory undergraduate level.  
**Prerequisite:** CVEN 365.

CVEN 436 Case Histories in Geotechnical Engineering  
**Credits 3. 2 Lecture Hours. 2 Lab Hours.**  
Examination of geotechnical problems through the use of case studies associated with foundations, waste disposal, slope stability, retaining structures, soil improvement and other civil engineering works.  
**Prerequisite:** CVEN 365.

CVEN 444 Structural Concrete Design  
**Credits 3. 3 Lecture Hours.**  
Behavior, design, and detailing of reinforced concrete structural members according to the ACI Building Code Requirements; design for ultimate limit states (flexible, shear, and axial loads) and serviceability requirements (cracking and deflection); applications include continuous beams and moment frames.  
**Prerequisites:** CVEN 345; CVEN 342 or CVEN 343 or registration therein.

CVEN 445 Matrix Methods of Structural Analysis  
**Credits 3. 3 Lecture Hours.**  
Analysis of framed structures using linear algebra concepts; matrix algebra and solution of linear algebraic equations; energy principles and virtual work; stiffness; coordinate transformations; use of commercial software for structural analysis.  
**Prerequisites:** CVEN 345 and CVEN 363.

CVEN 446 Structural Steel Design  
**Credits 3. 3 Lecture Hours.**  
Design of structural steel elements found in building structures, including tension members, compression members, beams, beam-columns and base plates; design of bolted and welded simple connections; design of bolted eccentric connections; design of bolted and welded partially and fully restrained connections.  
**Prerequisite:** CVEN 345.

CVEN 451 Public Works Engineering  
**Credits 3. 3 Lecture Hours.**  
Public works engineering; service demand estimates; water, wastewater and solid waste collection systems; urban drainage; code enforcement and public decision making.  
**Prerequisites:** CVEN 301 and CVEN 339.

CVEN 454 Urban Planning for Engineers  
**Credits 3. 2 Lecture Hours. 3 Lab Hours.**  
Urban planning from an engineering point of view; determinants of land use patterns, planning data collection and analysis; location and design requirements for various land uses; interrelationship of transportation and land use; and methods of plan development.  
**Prerequisite:** CVEN 307.

CVEN 455 Urban Stormwater Management  
**Credits 3. 3 Lecture Hours.**  
Hydrologic, hydraulic, and general civil engineering design and implementation of stormwater systems including drainage and detention storage facilities, floodplain regulation measures, and flood control structures; stormwater aspects of land development and public works engineering; flood hydrology and hydraulics; institutional aspects of urban stormwater management.  
**Prerequisite:** CVEN 339 or approval of instructor.

CVEN 456 Highway Design  
**Credits 3. 2 Lecture Hours. 3 Lab Hours.**  
Theory and practice in highway design; highway classification and design criteria, location studies, design of vertical and horizontal alignment, cross section, pavement, intersections and highway drainage elements.  
**Prerequisite:** CVEN 307.

CVEN 457 Urban Traffic Facilities  
**Credits 3. 3 Lecture Hours.**  
Driver, vehicle and roadway characteristics related to design and operation of traffic facilities; selection and design of traffic control devices and information systems for streets and highways; accident analysis and tort liability related to traffic engineering.  
**Prerequisite:** CVEN 307.

CVEN 458 Hydraulic Engineering of Water Distribution Systems  
**Credits 3. 3 Lecture Hours.**  
Pressure conduit hydraulics; design, modeling, and analysis of water conveyance and distribution systems including pipelines, pipe networks, and pumps.  
**Prerequisite:** CVEN 339 or approval of instructor.

CVEN 463 Engineering Hydrology  
**Credits 3. 3 Lecture Hours.**  
Occurrence, distribution and properties of natural waters of the earth; measurement and engineering analysis of hydrologic phenomena including precipitation, streamflow and groundwater, hydrologic design of water resources development and management projects.  
**Prerequisite:** CVEN 339.
CVEN 473 Engineering Project Estimating and Planning  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Application of cost estimating and planning techniques for civil engineering projects; introduction to labor, materials and equipment costing; productivity analysis; indirect and general overhead costs; preparation of approximate and definitive estimates; and integration of time/cost relationships through critical path method and resource leveling.  
Prerequisites: CVEN 349; senior classification.  

CVEN 483 Analysis and Design of Structures  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Overall procedure of analysis and design including functions, loads, layouts of force systems; analysis, specifications, cost comparisons, and maintenance as applied to typical building structures.  
Prerequisites: CVEN 365 or registration therein; CVEN 444 and 446.  

CVEN 485 Directed Studies  
Credits 1 to 3. 1 to 3 Other Hours.  
Research and design problems of limited scope approved on an individual basis intended to promote independent study; results of study presented in writing.  
Prerequisite: Approval of department head.  

CVEN 489 Special Topics in...  
Credits 1 to 4. 0 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified area of civil engineering. May be repeated for credit.  
Prerequisite: Approval of department head.  

CVEN 491 Research  
Credits 1 to 4. 1 to 4 Other Hours.  
Research conducted under the direction of faculty members in civil engineering. May be repeated 2 times for credit.  
Prerequisites: Junior or senior classification and approval of instructor.  

CVEN 601 Environmental Engineering Processes III  
Credits 3. 3 Lecture Hours.  
Biological processes that describe behavior of materials in natural and engineered environmental systems including fundamental theory of kinetics, bioenergetics, genetics and cellular functions.  
Prerequisites: CVEN 301.  

CVEN 603 Environmental Engineering Management  
Credits 3. 3 Lecture Hours.  
Federal and state regulatory framework for environmental engineering; techniques for environmental control; risk assessment; evaluation of critical environmental problems with multimedia aspects.  
Prerequisite: CVEN 301 or approval of instructor.  

CVEN 604 Engineering Analysis of Treatment Systems  
Credits 3. 3 Lecture Hours.  
Theory of processes used to treat water, wastewater and hazardous wastes; applications of theory to design and operation of treatment systems, including biological treatment, adsorption, coagulation, filtration and precipitation.  
Prerequisites: CVEN 601, CVEN 619, CVEN 620.  

CVEN 605 Environmental Measurement  
Credits 3. 1 Lecture Hour. 6 Lab Hours.  
Theory and practice of analytical methods used in the environmental engineering field; instrumental and wet chemical techniques used in measurement of environmental quality parameters and pollutants.  
Prerequisite: CVEN 620 or approval of instructor.  

CVEN 606 Environmental Engineering Design  
Credits 3. 3 Lecture Hours.  
Design of engineered environmental systems for water or wastewater treatment in domestic or industrial applications.  
Prerequisite: CVEN 604 or approval of instructor.  

CVEN 607 Engineering Aspects of Air Quality  
Credits 3. 3 Lecture Hours.  
Characterization of air contaminants; health effects and legal aspects; dispersion of pollutants in the atmosphere; technology for the control of gaseous and particulate emissions.  
Prerequisite: CVEN 311.  

CVEN 609 Environmental Control of Oil and Hazardous Materials  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Oil and hazardous material (OHM) spills in the engineering design process; evaluation of OHM properties and their behavior and impact to environmental systems; prevention programs and documents, technology for spill containment and removal; contingency planning cycle including administrative site-specific plans and resource acquisition; response organization; restoration and documentation.  
Prerequisite: CVEN 301 or approval of instructor.  

CVEN 610/PHEO 650 Environmental Risk Assessment  
Credits 3. 3 Lecture Hours.  
Risk assessment of the environment and human exposure in a statistically-based approach to determine allowable levels of exposure without significant deleterious effects; the basic approach of hazard identification; data collection and analysis; toxicity assessment; risk characterization; applications in ecological and human risk assessment; risk analysis performed.  
Prerequisite: CHEM 222 or equivalent.  
Cross Listing: PHEO 650.  

CVEN 612 Tools for Highway Materials and Pavement Design  
Credits 3. 3 Lecture Hours.  
Theory and practice in pavement design; pavement performance; structural design of pavement layers; types of materials used in pavement layers; characterization of pavement layer materials; concepts of pavement management; hands-on application of pavement design computational tools.  
Prerequisite: Graduate classification in civil engineering or approval of instructor.  

CVEN 613 Micromechanics of Civil Engineering Materials  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Discrete-particle and continuum micromechanics energy principles; finite-element and discrete-element formulations for constitutive modeling of asphalt, concrete, and coarse and fine-grained soils; adhesive and cohesive fracture and healing; stress-dependent plasticity; principles and measurement of surface energy and pseudo-strain.  
Prerequisite: CVEN 615, CVEN 616 or approval of instructor.  

CVEN 614 Stabilization of Soil-Aggregate Systems  
Credits 3. 3 Lecture Hours.  
Theory and practice of chemical stabilization of soils and aggregate systems with traditional methods of chemical stabilization including Portland cement, lime, fly ash and by products (kiln dusts, fly ash and slag materials); selected non-traditional methods including polymers, ionic systems, and enzymes; mechanisms and methods to avoid deleterious reactions.
CVEN 615 Structural Design of Pavements
Credits 3. 3 Lecture Hours.
Characteristics of pavement loads, stress analysis in pavements, design practices, construction, rehabilitation and maintenance.
Prerequisite: CVEN 418.

CVEN 616 Systems Design of Pavements
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Optimization of the design of rigid and flexible pavement systems; empirical and mechanistic stochastic structural subsystems; utility theory, serviceability concept, cost studies, traffic delay, environmental deterioration, rehabilitation and maintenance optimization systems.
Prerequisite: CVEN 418.

CVEN 617 Traffic Engineering: Characteristics
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Human, vehicular and traffic characteristics as they relate to driver-vehicle-roadway operational systems; traffic studies and methods of analysis and evaluation.
Prerequisite: CVEN 457 or equivalent.

CVEN 618 Traffic Engineering: Operations
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Advanced theory and application of traffic control; signalization and freeway operations.
Prerequisite: CVEN 457 or equivalent.

CVEN 619 Environmental Engineering Processes I
Credits 3. 3 Lecture Hours.
Physical processes that describe behavior of materials in natural and engineered environmental systems including transport phenomenon, sorption, desorption, flocculation and sedimentation.
Prerequisite: CVEN 301.

CVEN 620 Environmental Engineering Processes II
Credits 3. 3 Lecture Hours.
Chemical processes that describe behavior of materials in natural and engineered environmental systems including neutralization, precipitation, complex formation, adsorption, oxidation-reduction, coagulation, volatilization and absorption.
Prerequisites: CVEN 301.

CVEN 621 Advanced Reinforced Concrete Design
Credits 3. 3 Lecture Hours.
Reinforced concrete principles; analysis of rigid building frames, design of building frames, slabs, biaxially loaded columns, rectangular and circular tanks, and deep beams.
Prerequisite: CVEN 444 or equivalent.

CVEN 622 Properties of Concrete
Credits 3. 3 Lecture Hours.
Materials, properties and behavior of concrete; cement, cement types, aggregate characteristics; properties of fresh concrete; structure of portland cement paste; mechanical properties of hardened concrete; durability and repair of concrete structures.
Prerequisites: CVEN 342.

CVEN 623 Nondestructive Pavement Evaluation
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Nondestructive measurements and analysis methods of pavement data collection to determine riding quality, vehicle dynamics, surface texture, layer thickness, stiffness, moisture and distress using seismic, laser, radar, infrared, impulse, image analysis, and wave propagation. Content applies to construction quality control and evaluation of risk, reliability and remaining life of pavements.
Prerequisite: CVEN 616 or approval of instructor.

CVEN 624 Infrastructure Engineering and Management
Credits 3. 3 Lecture Hours.
Defines the infrastructure deterioration problems in the United States and describes the engineering and management approaches to arrest the deterioration.
Prerequisite: Graduate classification in engineering or approval of instructor.

CVEN 625 Traffic Engineering: Design
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Design of traffic control device installations with special emphasis on traffic signal design and installation, including the design features of detector placement and operation; national and state design standards and guidelines for traffic control device installation.
Prerequisite: CVEN 457.

CVEN 626 Highway Safety
Credits 3. 3 Lecture Hours.
Fundamental concepts for performing traffic safety analyses; crash data collection and database management; safety improvement programs; accident data analysis; development of statistical models; before-after studies; economic analyses; accident risk.

CVEN 627 Engineering Surface Water Hydrology
Credits 3. 3 Lecture Hours.
Precipitation-runoff processes; watershed and streamflow modeling; frequency analysis; erosion and sedimentation engineering; hydrologic design of hydraulic structures and nonstructural stormwater management strategies.
Prerequisite: Graduate classification in engineering or approval of instructor.

CVEN 628 Advanced Hydraulic Engineering
Credits 3. 3 Lecture Hours.
Modeling of steady and unsteady flow in natural and constructed channels and hydraulic structures. Open channel hydraulics. Design and analysis of hydraulic structures, canals, and flood mitigation projects. Sediment and contaminant transport in river systems.
Prerequisite: CVEN 339 or approval of instructor.

CVEN 631 System Identification and Nondestructive Damage Evaluation of Civil Engineering Structures
Credits 3. 3 Lecture Hours.
Invasive assessment of civil structures; concepts of systems identification, damage detection, and safety evaluation; estimation of mass, damping, and stiffness properties; determination of load capacity and useful life.
Prerequisite: Graduate classification in Civil Engineering, Aerospace Engineering or Mechanical Engineering.

CVEN 632 Transportation Engineering: Economics
Credits 3. 3 Lecture Hours.
Engineering and economic principles for transportation systems; engineering evaluation using methods of travel demand, costs, equilibrium and pricing; use of economic principles for the finance, engineering and management of transportation systems.
Prerequisite: CVEN 672 or approval of instructor.

CVEN 633 Advanced Mechanics of Materials
Credits 3. 3 Lecture Hours.
Stresses and strains at a point, torsion of noncircular cross sections, beams with combined axial and lateral loads, energy methods, thick walled pressure vessels, theories of failure, introduction to the theory of elasticity, theory of plates, theory of elastic stability and solution to elementary problems.
Prerequisite: MATH 308 or approval of instructor.
CVEN 635 Street and Highway Design
Credits 3. 3 Lecture Hours.
Advanced concepts of the design of streets and highways, design criteria, controls and standards for design alignment, cross section, intersections and interchanges and environmental impacts of surface transport facilities.
**Prerequisite:** CVEN 456 or equivalent.

CVEN 637 Rigid Pavement Analysis and Design
Credits 3. 3 Lecture Hours.
Introduction to mechanistic rigid pavement design concepts; development of mathematical pavement models and application of the models to design analysis; relationship of pavement response to performance and fatigue damage concepts in design; evaluation of pavement design practice and procedures for highways and airports; rigid pavement overlay design concept.
**Prerequisite:** CVEN 418.

CVEN 638 Computer Integrated Construction Engineering Systems
Credits 3. 3 Lecture Hours.
Modeling concepts, issues and techniques of computer integrated construction engineering systems; current research and practice in design and implementation of computer integrated construction systems, with emphasis on the integration of engineering, construction planning, monitoring and control through management information systems, decision support systems, knowledge based systems and discrete event simulation systems.
**Prerequisite:** CVEN 349.

CVEN 639 Methods Improvement for Construction Engineers
Credits 3. 3 Lecture Hours.
Application of work methods and measurements to civil engineering construction; examination of factors that affect productivity in construction; study of motivational factors; review of the principles of accident prevention.
**Prerequisites:** CVEN 405 and CVEN 473 or approval of instructor.

CVEN 640 Project Development: Methods and Models
Credits 3. 3 Lecture Hours.
Development of new projects; public-private partnerships; flexible design and stage-based construction; project risk analysis and management; estimating and budgeting; optimal project decisions; advanced techniques for modeling project performance.
**Prerequisite:** STAT 601 or approval of instructor.

CVEN 641 Construction Engineering Systems
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Application of systems theory to project planning and control; probabilistic network diagramming, resource allocation, statistical bidding analysis, activity planning, financial management of construction projects and project control.
**Prerequisite:** CVEN 473 or approval of instructor.

CVEN 644 Project Risk Management
Credits 3. 3 Lecture Hours.
Identifies causes of risks in projects; discusses probabilistic description of risks and formulation of risk models; Bayesian methods for revising probabilities; qualitative and quantitative risk assessment; setting contingencies on budgets and schedules; risk mitigation and risk management; handling technological risk; Utility theory and game theory in management of risks.
**Prerequisites:** ISEN 644/CVEN 644; STAT 211, STAT 601 or equivalent.

CVEN 645 Geotechnical Site Investigation
Credits 2. 2 Lecture Hours.
Soil sampling techniques to obtain disturbed and undisturbed samples; in situ field tests including standard penetration test, cone penetration test, vane test, pressuremeter test and their use in practice; other recent advances in sampling, in situ testing and site investigation both onshore and offshore.
**Prerequisites:** CVEN 365; CVEN 435 or equivalent.

CVEN 646 Foundations on Expansive Soils
Credits 3. 3 Lecture Hours.
Properties of partially saturated soils, analysis of beams and plates on foundations, slab-subgrade friction, design of slabs and drilled piers, soil improvement techniques, risk analysis and foundation rehabilitation operations.
**Prerequisites:** CVEN 365 and MATH 308 or approval of instructor.

CVEN 647 Numerical Methods in Geotechnical Engineering
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Formulation and application of finite element and discrete element methods in solving geotechnical engineering problems related to seepage, diffusion, elasticity, plasticity, fracture and dynamic motion of soil masses, stability and convergence problems and use of existing computer programs in working applied problems.
**Prerequisite:** Degree in engineering or approval of instructor.

CVEN 648 Advanced Numerical Methods in Geotechnical Engineering
Credits 3. 3 Lecture Hours.
Formulation and application of finite difference and finite element methods in geotechnical problems related to elasticity, plasticity, seepage, consolidation, dynamic response, and pile analysis; constitutive models of soil behavior; and analysis of nonlinear systems.
**Prerequisites:** MEMA 646 or equivalent; CVEN 651 or registration therein.

CVEN 649 Physical and Engineering Properties of Soil
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Introduction to physico-chemical properties of soils; soil structure; soil classification; permeability; principle of effective stress; stress-deformation and strength characteristics; partly saturated soils; testing procedures.
**Prerequisites:** CVEN 365 and CVEN 435 or approval of instructor.

CVEN 651 Geomechanics
Credits 3. 3 Lecture Hours.
Fundamentals of mechanics of deformable bodies; theory and application of elasticity, plasticity, viscoelasticity and approximate rheological models to soil mechanics problems.
**Prerequisite:** Approval of instructor.

CVEN 652 Soil Dynamics
Credits 3. 3 Lecture Hours.
Dynamic properties of soil; wave propagation in an elastic medium; analysis of dynamic soil-structure interaction and machine foundations; earthquake engineering; soil liquefaction; seismic design of foundations, dams, retaining walls and pipelines.
**Prerequisite:** MATH 308.

CVEN 653 Bituminous Materials
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Production, specifications and tests of bituminous materials; design and evaluation of asphaltic concrete for construction and maintenance; inspection control of street, parking and highway paving surfaces.
**Prerequisite:** Approval of instructor.
CVEN 654/ISEN 643 Strategic Construction and Engineering Management
Credits 3. 3 Lecture Hours.
Strategic and systems perspectives applied to construction and engineering management projects, organizations and industries; system dynamics methodology to model construction and engineering systems; understanding drivers of performance; feedback and high leverage points for performance improvement.
Prerequisite: Graduate classification or approval of instructor.
Cross Listing: ISEN 643/CVEN 654.

CVEN 655 Structural Reliability
Credits 3. 3 Lecture Hours.
Uncertainties in structural mechanics; probabilistic models for load and resistance variables, fundamentals of structural reliability theory, advanced first-order second moment methods and reliability of complex structural systems; applications to selected structures.
Prerequisites: CVEN 345 and CVEN 421.

CVEN 656 Bridge Engineering
Credits 3. 3 Lecture Hours.
Overview of design of highway bridges, and an introduction to maintenance of highway bridges; history of bridge engineering, types of bridges and materials of construction, design rules, loads, inspection, rating and preventive maintenance, esthetics.
Prerequisite: CVEN 345.

CVEN 657 Dynamic Loads and Structural Behavior
Credits 3. 3 Lecture Hours.
Dynamic modeling of single, multidegree of freedom and continuous systems; dynamic load factors; damping; node superpositions; numerical integration; dynamic behavior of structures and structural elements under action of dynamic loads resulting from wind, earthquake, blast, impact, moving loads and machinery.
Prerequisites: MATH 308 and MEMA 467 or approval of instructor.

CVEN 658 Civil Engineering Applications of GIS
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Use of geographic information system (GIS) concepts and methods to solve civil engineering problems; emphasis on different areas of civil engineering. Class presentations and laboratory sessions used to familiarize students with computer software.
Prerequisite: Graduate classification.

CVEN 659 Behavior and Design of Steel Structures
Credits 3. 3 Lecture Hours.
Buckling and post-buckling strength of stiffened and unstiffened plate elements and members; torsional behavior and design of beams; stability of frames; frames subject to sidesway; bracing design; non-destructive evaluation and application of fracture mechanics principles to welded structures.
Prerequisite: 3 credit hours of structural steel design or approval of instructor.

CVEN 662 Experimental Methods in Civil Engineering
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Introduction to experimental methods, instrumentation, data acquisition and data processing; experimental aspects of static and dynamic testing in the various areas of civil engineering; overview of laboratory work with several hands-on applications in the laboratory.
Prerequisite: Graduate classification in engineering.

CVEN 663 Structural Stability
Credits 3. 3 Lecture Hours.
Buckling of columns, frames, arches, rings, plates and shells, lateral and torsional buckling of beams, Newmark's method, equilibrium method, Rayleigh-Ritz, variational principles; Galerkin method, Trefftz method, review of current literature.
Prerequisites: MATH 308; approval of instructor.

CVEN 664 Water Resources Engineering Planning and Management
Credits 3. 3 Lecture Hours.
Managing water resources; the planning process, systems analysis methods; institutional framework for water resources engineering; comprehensive integration of engineering, economic, environmental, legal and political considerations in water resources development and management.
Prerequisite: Graduate classification in engineering or approval of instructor.

CVEN 665 Water Resources Systems Engineering
Credits 3. 3 Lecture Hours.
Linear and non-linear optimization models and simulation models for planning and management of water systems; single- and multi-objective analysis and deterministic and stochastic techniques.
Prerequisites: CVEN 339; CVEN 422 or equivalent.

CVEN 666 Foundation Structures
Credits 3. 3 Lecture Hours.
Geological and soil mechanics principles: load bearing capacity, soil pressure and settlement; design of shallow foundation sub-structures: pedestals, spread footings, combined footings, mats and underream footings; design of deep foundations: piles and drilled piers; retaining walls, cofferdams and sheet piles.

CVEN 667 Slope Stability and Retaining Walls
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Slope stability; failure analysis including methods of slices; risk analysis; earthquake analysis; monitoring; remedial measures; retaining structures; basic theories; gravity walls; cantilever walls; tieback walls; mechanically stabilized walls; soil nailing; deflecting-based analysis.
Prerequisites: CVEN 365 or equivalent; graduate classification.

CVEN 668 Advanced EPC Project Development
Credits 3. 3 Lecture Hours.
Examines the advanced project development process-business planning and pre-project planning for engineering, procurement and construction (EPC); a process approach is followed. Issues covered are project technical and economic feasibility; scope definition; project risks; preliminary budgeting; scheduling and parametric estimating; execution strategies; negotiations; organizational design and development.
Prerequisite: Graduate classification in engineering or approval of instructor.

CVEN 669 Design of Structures for Hazardous Environmental Loads
Credits 3. 3 Lecture Hours.
Introduction to wind and earthquake engineering with focus on studying the characteristics and effects of various types of windstorms and earthquakes; development of tools that can be used in specifying wind and earthquake loads on structures.
Prerequisite: Approval of instructor.
CVEN 670 Behavior and Design of Composite Structures  
Credits 3.3 Lecture Hours.  
Design of composite structural systems comprising structural steel and reinforced concrete; composite slabs on steel beams; composite slabs on formed metal deck; columns; moment frame systems; shear wall systems; braced frame systems; dual systems; introduction to retrofitting applications.  
Prerequisites: CVEN 444; CVEN 446 or equivalent; graduate classification.

CVEN 671 Behavior and Design of Prestressed Concrete Structures  
Credits 3.3 Lecture Hours.  
Introduction to the behavior and design of prestressed concrete structural members for several limit states; including flexure, shear, torsion and deflection; exposure to composite beams; indeterminate systems; bridge design and construction.  
Prerequisites: CVEN 444; graduate classification in civil engineering or approval of instructor.

CVEN 672 Engineering and Urban Transportation Systems  
Credits 3.3 Lecture Hours.  
Characteristics of transportation engineering systems; transportation engineering data collection; modeling effects of engineering project planning, trip generation, trip distribution, mode choice and traffic assignment; use and interpretation of engineering modeling results; engineering project analysis.  
Prerequisite: Graduate classification in engineering or urban and regional planning or approval of instructor.

CVEN 673 Transport Phenomena in Porous Media  
Credits 3.3 Lecture Hours.  
Transport phenomena in porous media with special emphasis on fundamentals and applications to various geo-environmental problems.  
Prerequisites: CVEN 311 and MATH 308 or approval of instructor.

CVEN 674 Groundwater Engineering  
Credits 3.3 Lecture Hours.  
Groundwater hydrology, theory of groundwater movement, steady-state flow, potential flow, mechanics of well flow, multiple-phase flow, salt water intrusion, artificial recharge, groundwater contamination and models.  
Prerequisite: CVEN 311 or approval of instructor.

CVEN 675 Stochastic Hydrology  
Credits 3.3 Lecture Hours.  
Analysis, simulation and forecasting of hydro-climatic variables.  
Prerequisites: CVEN 421 and CVEN 463 or approval of instructor.

CVEN 679 Experimental Fluid Mechanics Modeling  
Credits 3.3 Lecture Hours.  
Dimensional analysis; modeling laws; measurement techniques and instrumentation; experimental control and data acquisition; sampling theory and signal processing; applications to coastal, ocean, and hydraulic engineering models.  
Prerequisite: Approval of instructor.

CVEN 680 Advanced Computation Methods for Fluid Flow  
Credits 3.3 Lecture Hours.  
Unsteady three-dimensional Navier-Stokes equations in general nonorthogonal curvilinear coordinates; algebraic and elliptic grid generation; turbulence modeling for complex flows; advanced numerical methods for unsteady incompressible turbulent flows; large-eddy simulations; Reynolds-averaged Navier-Stokes simulation; chimera domain decomposition and interactive zonal approach.  
Prerequisite: CVEN 688 or approval of instructor.

CVEN 681 Seminar  
Credit 1.2 Lab Hours.  
Reports and discussion of current research and selected published technical articles.

CVEN 682 Environmental Remediation of Contaminated Sites  
Credits 3.3 Lecture Hours.  
Aspects of characterization and design of plans for remediation of sites contaminated with hazardous wastes; review of federal and state regulations; risk assessment; remedial technology screening and design of remedial plans.  
Prerequisites: CVEN 601, CVEN 619, CVEN 620.

CVEN 683 Dynamic Soil Structure Interaction  
Credits 3.3 Lecture Hours.  
Introduction to basic concepts of wave propagation; soil dynamics; applications to the design of machine foundations; geotechnical earthquake engineering; soil effects on the characteristics of earthquake motions; liquefaction; dynamic stiffness of foundations; seismic soil structure interaction.  
Prerequisite: Graduate classification.

CVEN 684 Professional Internship  
Credits 1 to 2.1 to 2 Other Hours.  
Training under the supervision of practicing professional engineers in settings appropriate to the student's professional objectives, away from Texas A&M campus. May be taken two times for credit.  
Prerequisites: Approval of the department head and two semesters of graduate work completed.

CVEN 685 Directed Studies  
Credits 1 to 12.1 to 12 Other Hours.  
Enables majors in civil engineering to undertake and complete with credit in their particular fields of specialization limited investigations not within their thesis research and not covered by other courses in established curriculum.

CVEN 686 Offshore and Coastal Structures  
Credits 3.3 Lecture Hours.  
Fundamental design and analysis techniques; offshore platforms for shallow and deep water, pile supported, gravity based and floating platforms; new design problems faced by offshore industry will be examined by class during the semester.  
Prerequisite: Approval of instructor.

CVEN 687 Foundation Engineering  
Credits 3.3 Lecture Hours.  
Settlement and bearing capacity analysis of foundations; computer programs used to analyze axially-loaded piles, laterally-loaded piles and sheet-pile walls.  
Prerequisites: CVEN 365; approval of instructor.

CVEN 688 Computational Fluid Dynamics  
Credits 3.3 Lecture Hours.  
Finite-difference and finite-element methods and basic numerical concepts for the solution of dispersion, propagation and equilibrium problems commonly encountered in real fluid flows; theoretical accuracy analysis techniques.  
Prerequisites: Undergraduate course in fluid mechanics; MATH 601 and/or basic course in linear algebra; knowledge of one programming language.
CVEN 689 Special Topics in... 
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 6 Lab Hours. 
Selected topics in an identified area of civil engineering. May be repeated for credit. 
Prerequisites: Approval of instructor and department head.

CVEN 691 Research 
Credits 1 to 23. 1 to 23 Other Hours. 
Research for thesis or dissertation.

CVEN 695 Frontiers in Civil Engineering Research 
Credits 1 to 3. 1 to 3 Lecture Hours. 
The present status of investigative work in a variety of civil engineering fields; content selected based on visiting lecturers of distinguished international recognition in their fields of research. 
Prerequisite: Approval of instructor.

CVEN 696 Urban Traffic Facilities 
Credits 3. 3 Lecture Hours. 
Driver, vehicle and roadway characteristics related to design and operation of traffic facilities; selection and design of traffic control devices and information systems for streets and highways; accident analysis and tort liability related to traffic engineering. 
Prerequisite: Graduate classification.

CVEN 699 Engineering Risk Analysis 
Credits 3. 3 Lecture Hours. 
Introduction to applications of probability theory, statistics, and decision analysis to civil engineering problems; emphasis on probabilistic modeling and analysis of civil engineering problems, Bayesian statistics, risk analysis, and decision under uncertainty. 
Prerequisite: STAT 211 or approval of instructor.

CVEN 710 Civil Engineering Project Finance 
Credits 3. 3 Lecture Hours. 
Fundamentals of financing civil engineering projects; Public-Private Partnerships (PPPs); interdependencies between engineering and financing decisions; equity and debt markets; type of debt instruments: loans vs. bonds; risk identification, quantification, and management; engineering due-diligence; pricing risk premium; hedging using civil engineering design strategies.

CVEN 717/ISEN 642 Engineering Project Control 
Credits 3. 3 Lecture Hours. 
Project controls bridge from information-based to physical-based development processes; includes detailed design, testing of designs, design realization, and preparation of facilities for steady state operations; application of basic project control theories, tools, and methods to development projects. 
Prerequisite: Graduate classification in civil engineering or industrial and systems engineering or approval of instructor. 
Cross Listing: ISEN 642.

CVEN 740 Advanced Constitutive Behavior of Cementitious Materials 
Credits 3. 3 Lecture Hours. 
Advanced multi-scale constitutive behavior of cementitious materials, including composite behavior, elasticity, viscoelasticity, aging, free strains, poromechanical behavior, thermal and moisture strains, and thermal, moisture, and ionic transport; focus on experimental observation and analytical modeling. 
Prerequisite: CVEN 343 or CVEN 622 or approval of instructor.

CVEN 741 Tools for Highway Materials and Pavement Design 
Credits 3. 3 Lecture Hours. 
Theory and practice in pavement design; pavement performance; structural design of pavement layers; types of materials used in pavement layers; characterization of pavement layer materials; concepts of pavement management; hands-on application of pavement design computational tools. 
Prerequisite(s): Graduate classification in civil engineering or approval of instructor. Stacked with CVEN 418.

CVEN 750 Finite Element Applications in Structural Engineering 
Credits 3. 2 Lecture Hours. 2 Lab Hours. 
Role of the finite element method (FEM) in structural engineering; use of commercial finite element software; application of FEM method for various structural engineering problems; selection of appropriate FEM models; types of elements and mesh sizes; use and interpretation of FEM results. 
Prerequisite: CVEN 445 or approval of instructor.

CVEN 751 Advanced Dynamics and Control of Civil Engineering Structures 
Credits 3. 3 Lecture Hours. 
Fundamentals of smart structures including structural dynamics, damping, sensors, control concepts, smart materials, modeling of smart structures, and signal processing; semi-passive concepts, energy harvesting, semi-active concepts, active vibration control, active noise control, shape adaptation, and structural health monitoring. 
Prerequisite(s): CVEN 657, MEMA 647 or equivalent, or approval of instructor.

CVEN 752 Smart Structures 
Credits 3. 3 Lecture Hours. 
Fundamentals of smart structures including structural dynamics, damping, sensors, control concepts, smart materials, modeling of smart structures, and signal processing; semi-passive concepts, energy harvesting, semi-active concepts, active vibration control, active noise control, shape adaptation, and structural health monitoring. 
Prerequisite(s): CVEN 653 or equivalent or graduate classification in CVEN or approval of instructor.

CVEN 753/MEMA 634 Damage Mechanics of Solids and Structures 
Credits 3. 3 Lecture Hours. 
Damage mechanics; constitutive modeling of damage behavior of materials; application of thermodynamic laws; computational techniques for predicting progressive damage and failure; plasticity; viscoplasticity; viscoelasticity; cohesive zone modeling; fatigue and creep damage; damage in various brittle and ductile materials (e.g., metal, concrete, polymer, ceramic, asphalt, biomaterial, composites). 
Prerequisite: CVEN 633 or approval of instructor. 
Cross Listing: MEMA 634/CVEN 753.

CVEN 754 Advanced Structural Design Studio 
Credits 3. 1 Lecture Hour. 6 Lab Hours. 
Comparative design, construction, and service-life performance analysis of integrated and complex structural systems, including design loads, load paths, and structural detailing requirements; comparison of alternative structural system solutions; investigation into new technologies and structural design and/or construction approaches; examples drawn from bridges, buildings and other large civil structures. 
Prerequisites: CVEN 659 or registration therein, CVEN 671 or registration therein, CVEN 750 or registration therein, or approval of instructor.
CVEN 765 Advanced Civil Engineering Systems
Credits 3. 3 Lecture Hours.
Formulation of decision making problems at different hierarchical levels: strategic, planning and operational; includes application problems in project selection, networks, allocation, routing/scheduling, distribution, and multi-objective; introduction to exact and approximate solving techniques: optimization, heuristics, simulation, and decision analysis; solution interpretation and sensitivity analyses.
Prerequisite: CVEN 322 or approval of instructor.

CVEN 766 Highway Design
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Theory and practice in highway design; highway classification and design criteria, location studies, design of vertical and horizontal alignment, cross section, intersections, environmental factors, and highway drainage elements.
Prerequisites: CVEN 307 or approval of instructor.

DASC - Dairy Science

Courses

DASC 202 Dairying
Credits 3. 2 Lecture Hours. 2 Lab Hours.
(AGRI 1311) Dairying. Survey of dairy industry; dairy breeds, standards for selection and culling, herd replacements, feeding, management, physiology and health maintenance; food value of milk, tests for composition and quality, use and processing of market milk and dairy products.

DASC 312/FSTC 312 Food Chemistry
Credits 3. 3 Lecture Hours.
The fundamental and relevant chemistry and functionality of the major food constituents (water, carbohydrates, lipids, proteins, phytochemical nutraceuticals) and study of food emulsion systems, acids, enzymes, gels, colors, flavors and toxins.
Prerequisite: CHEM 227; CHEM 237 or approval of department head or instructor.
Cross Listing: FSTC 312/DASC 312.

DASC 313/FSTC 313 Food Chemistry Laboratory
Credit 1. 3 Lab Hours.
Laboratory exercises investigating specific molecules, such as food acids, enzymes, pigments and flavors, and chemical interactions in foods, such as oxidation reactions, emulsion systems, and functional properties from a fundamental chemistry rather than an analytical perspective.
Prerequisite: CHEM 227; CHEM 237 or approval of department head or instructor.
Cross Listing: FSTC 313/DASC 313.

DASC 326/FSTC 326 Food Bacteriology
Credits 3. 3 Lecture Hours.
Microbiology of human foods and accessory substances; raw and processed foods; physical, chemical and biological phases of spoilage; standard industry techniques of inspection and control.
Prerequisites: BIOL 206 or approval of instructor; junior or senior classification.
Cross Listing: FSTC 326/DASC 326.

DASC 327/FSTC 327 Food Bacteriology Lab
Credit 1. 3 Lab Hours.
Laboratory to accompany DASC 326/FSTC 326.
Cross Listing: FSTC 327/DASC 327.

DASC 400 Animal Science Industry Studies
Credits 1 to 3. 1 to 3 Other Hours.
Organized instruction based on well-planned visits to selected industry operations which produce, process or market animal and dairy products, or produce and market supplies and materials to support animal industries; acquaint students with such operations, to reinforce campus-based instruction and to acquaint prospective employers with Texas A&M students. Field trips will normally be made during holidays or between sessions for which departmental fees may be assessed to cover costs.
Prerequisites: Junior or senior classification; approval of instructor organizing study tour; 2.0 GPR in major and overall.

DASC 418 Feeding and Management of Dairy Cattle
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Dairy farm management; feeding and care of the dairy herd; raising calves for dairy replacements and for beef; developing dairy heifers; care of dry and fresh cows; optimum return rations for milk production; disease control; forage handling and storage; buildings and related topics.
Prerequisites: ANSC 318; DASC 202; DASC 400 also to be taken concurrently or approval of instructor.

DASC 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Special problems in dairy production or dairy manufacturing.
Prerequisites: Junior or senior classification; written approval of professor supervising the activity; 2.0 GPR in major and overall.

DASC 606/FSTC 606 Microbiology of Foods
Credits 3. 3 Lecture Hours.
Nature and function of beneficial and defect-producing bacteria in foods; food-borne illness, effects of processing, storage and distribution; techniques for isolation and identification from foods.
Cross Listing: FSTC 606/DASC 606.

DASC 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Research methods and review of scientific literature dealing with individually selected problems in production or manufacturing and not pertaining to thesis or dissertation.

DASC 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research leading to thesis or dissertation in respective fields of dairy production and dairy manufacturing.

DCED - Dance Education
Courses

DCED 160 Ballet I
Credits 2.0 Lecture Hours. 5 Lab Hours.
(DANC 1241) Ballet I. Introduction to ballet technique for dancers; series of barre exercises progressing to center work, explanation of positions of the body and port de bras; understand proper body alignment as it relates to ballet technique; appreciation of ballet as an instrument of expression. May be taken 3 times for credit.
Prerequisites: Dance science majors, dance concentration majors and dance minors; or approval of instructor.

DCED 161 Ballet II
Credits 2.5 Lab Hours.
(DANC 1242) Ballet II. Intermediate study of ballet; historical background and the knowledge and understanding of its cultural heritage; increased level of difficulty in barre, center and across the floor; concentration and continual refinement of body/spatial awareness, musicality, alignment and execution of correct classical technique. May be taken 3 times for credit.
Prerequisite: DCED 160; dance science majors, dance concentration majors and dance minors; or approval of instructor.

DCED 162 Ballet III
Credits 2.5 Lab Hours.
(DANC 2241) Ballet III. Technical study of classical and contemporary ballet; elevated barre work, traditional components including turns, footwork, adagios, advanced center/floor phrases; study of Cecchetti, Vaganova, and collaborative methods; focus on strength, concentration and correct technique on performance combinations. May be taken 3 times for credit.
Prerequisite: DCED 161; dance science majors, dance concentration majors and dance minors; or approval of instructor.

DCED 168 Visual and Performing Arts--Jazz Dance III
Credits 2.4 Lab Hours.
(DANC 2247) Visual and Performing Arts--Jazz Dance III. Advanced study of jazz dance; reviews historical background and cultural heritage including significant jazz artists and their influence on jazz dance and society; increased development of coordination, endurance and flexibility necessary to performing extensive jazz combinations; placement exam required on the second day of class.
Prerequisite: KINE 167 or approval of instructor.

DCED 171 Modern Dance I
Credits 2.0 Lecture Hours. 5 Lab Hours.
(DANC 1245) Modern Dance I. Study and understanding of modern dance concepts; lateral curve, contraction, spiral, high curve, high release, rotation versus parallel, body alignment, moving in and out of the floor, fluidity of phrase work, musicality and kinesthetic awareness. May be taken 3 times for credit.
Prerequisites: Dance science majors, dance concentration majors and dance minors; or approval of instructor.

DCED 172 Modern Dance II
Credits 2.5 Lab Hours.
(DANC 1246) Modern Dance II. Intermediate study of modern dance; reviews, historical background and its development within society; continual study and understanding of modern dance concepts; fall/ recovery, contract/release, use of breath and weight, spine work, inversion and spatial awareness. May be taken 3 times for credit.
Prerequisite: DCED 171; dance science majors, dance concentration majors and dance minors; or approval of instructor.

DCED 173 Modern Dance III
Credits 2.5 Lab Hours.
(DANC 2245) Modern Dance III. Physical and artistic exploration of both traditional and contemporary training methods; three dimensional spine work, inversion, floor work and dynamics. May be taken 3 times for credit.
Prerequisite: DCED 172; dance science majors, dance concentration majors and dance minors; or approval of instructor.

DCED 202 Dance Appreciation
Credits 3.3 Lecture Hours.
Survey of dance as a cultural and artistic form in numerous countries; exploration of the development and influence of dance in various cultures; analysis of various genres of artistic dance and their development; discussion of aesthetic principles of dance as an art form and how choreographers are influenced by society to create work.

DCED 203 Dance Production
Credits 3.3 Lecture Hours.
Overview of philosophy, major aspects and common elements in producing dance concerts; lighting, sound, stage design, terminology, costuming, management, production designs, practical experience with on-stage performances.
Prerequisites: Dance science majors, dance concentration majors and dance minors; or approval of instructor.

DCED 301 Dance History
Credits 3.3 Lecture Hours.
Overview of current dance scene, career fields, education; development of theatrical, social, educational dance from lineage based to contemporary cultures; emphasis on dance in America, genres, roots, heritage, pioneers, crusading artists; impacts, influences, growth, development, trends and continual metamorphosis in the art world.
Prerequisite: Approval of instructor.

DCED 302 Health Practices for Dancers
Credits 2.2 Lecture Hours.
Focuses on health issues common to the dancer such as overtraining, drug use and performance anxiety, anatomy in relation to proper dance technique, misalignments, imbalances and injuries common to the dancer.
Prerequisites: Dance science majors only or approval of instructor; junior or senior classification.

DCED 304 Creative Dance for Children
Credits 3.3 Lecture Hours.
Theory and practice of creative movement classes for children; the development stages and learning outcomes of creative movement; incorporation of creative movement into children's classes; dance elements and benefits of creative movement; lesson plans and student assessment.
Prerequisite: Junior or senior classification or approval of instructor.

DCED 306 Dance Composition I
Credits 2.2 Lecture Hours.
Introduces choreographic devices in solo and duet movement studies; exploration of design principles; creating multiple movement studies using various elements of choreography.
Prerequisites: Dance science majors, dance concentration majors and dance minors; or approval of instructor; junior or senior classification.

DCED 400 Dance Composition II
Credits 2.2 Lecture Hours.
Introduces choreographic devices related to group movement studies; explore and create movement studies as a means of first and second function art, use choreographic tools in the dance making process as it relates to group work.
Prerequisites: DCED 306 or approval of instructor.
DCED 401 Dance Pedagogy  
**Credits 3. 3 Lecture Hours.**  
Study of dance pedagogy; major aspects of a dance teacher including knowledge of injury prevention, correct technique, preparation, presentation, evaluation of dance materials, levels and technique class; focus on various teaching methods, tools, planning, communication/instructional skills and learning experiences/styles.  
**Prerequisites:** DCED 301 and DCED 400 or approval of instructor; junior or senior classification.

DCED 402 Dance Composition III  
**Credits 2. 2 Lecture Hours.**  
Choreograph, design and produce a senior concert; accumulation of previous course work in composition should be used to bring the elements of the choreographic process to a final product.  
**Prerequisites:** DCED 400; dance science track majors only; admittance into the professional phase or approval of instructor; junior or senior classification.

## DDDS - Doctor Dental Surgery

### Courses

**DDDS 011 Anterior Composites and Esthetics**  
**Credits 0.**  
Advanced concepts including diagnosis, preparation and restoration of anterior teeth utilizing composite materials.

**DDDS 012 Forensic Dentistry**  
**Credits 0. 1 Lab Hour.**  
This summer semester course will introduce students to the Science of Forensic Dentistry, providing a broad overview of its scope but emphasizing forensic dental identification of deceased individuals. Identification procedures, particularly as they pertain to mass casualty situations, will be stressed. Twelve hours of hands-on laboratory participation in mock mass casualty exercises will allow students to utilize the knowledge they have gained and sharpen identification skills. This selective does not require clinic, but does require 12 hours of lab. Class time and location to be announced by course director. Class is limited to 35 D4 students only.

**DDDS 013 Orthodontic Clinical Selective**  
**Credits 0.**  
This is a clinical selective course in which D4 students will provide limited (adjunctive) orthodontic treatment to patients as one component of a comprehensive treatment plan. This treatment will be provided in conjunction with a third year orthodontic resident, and under the supervision of an orthodontic department faculty member.

**DDDS 014 Advanced Implant Dentistry – Case Analysis and Problem Based Approach**  
**Credits 0.**  
This course is designed for senior dental students who are interested in gaining advanced knowledge of implant dentistry. This course will give students advanced knowledge of implant supported restorations and their application in clinical dentistry. The course will include the evolution of implant dentistry, an interactive case-based session on treatment planning and case analysis, CAD-CAM technologies in implant dentistry, cone beam tomography, 3D treatment planning systems and digitally guided surgeries. Additionally, it will cover advanced implant treatment options (One on Four, Zygomatic Implants, Bioadaptable Implants...etc). The students will also be exposed to a wide variety of implant systems allowing them the chance to compare the most commonly distributed implant systems and their characteristics and applications. It will also include implants in the esthetic zone, implant complications, prevention and troubleshooting and the future direction of implant dentistry.

**DDDS 015 Interdisciplinary C.A.R.E. and Collaboration**  
**Credits 0.**  
This spring semester course will provide an opportunity for D-3 students to become more proficient at evaluating and integrating emerging trends in clinical care and identifying factors that differentiate one case from another. Clinical examples of interdisciplinary cases will be presented by post-doctoral residents that highlight a specific discipline (including contributions of other disciplines when appropriate). Both conventional and unconventional treatment methods will be presented.

**DDDS 016 Advanced Topics in Endodontics**  
**Credits 0. 1 Lab Hour.**  
This fall semester course provides advanced information and training in current Endodontic topics, including some of the state-of-the-art equipment used by endodontists today. These topics include: discussion of complex diagnostic cases, advanced cleaning and shaping techniques (i.e. new rotary instrumentation systems), advanced obturation techniques (i.e. warm vertical gutta-percha), notions of the utilization of an endodontic surgical microscope, and endodontic retreatment. This selective does not require clinic, but does require 2 hours of lab. Class time and location to be announced by course director. Participation in this selective course is by invitation only.

**DDDS 017 Advanced Implant Dentistry – Case Analysis and Problem Based Approach**  
**Credits 0.**  
This course is designed for senior dental students who are interested in gaining advanced knowledge of implant dentistry. This course will give students advanced knowledge of implant supported restorations and their application in clinical dentistry. The course will include the evolution of implant dentistry, an interactive case-based session on treatment planning and case analysis, CAD-CAM technologies in implant dentistry, cone beam tomography, 3D treatment planning systems and digitally guided surgeries. Additionally, it will cover advanced implant treatment options (One on Four, Zygomatic Implants, Bioadaptable Implants...etc). The students will also be exposed to a wide variety of implant systems allowing them the chance to compare the most commonly distributed implant systems and their characteristics and applications. It will also include implants in the esthetic zone, implant complications, prevention and troubleshooting and the future direction of implant dentistry.

**DDDS 018 Orthodontic Externship**  
**Credits 0. 1 Other Hour.**  
The seminar portion of the course provides the students with an opportunity to enhance their skills in the diagnosis and recognition of malocclusion and craniofacial anomalies, and the ramifications of these diagnoses in the development of comprehensive treatment plans. Faculty will provide examples of new cutting edge technologies that are rapidly changing the approach to treatment of orthodontic patients. The externship provides an opportunity to discuss management considerations and other issues involved in the operation of a specialty practice. This selective does not require clinic. Class time and location to be announced by course director. Class is limited to 10 D4 students only.

**DDDS 019 Fabrication of Complete Dentures Utilizing CAD/CAM Technology**  
**Credit 1. 1 Lab Hour.**  
The focus of this selective is the fabrication of complete dentures by CAD/CAM digital technology. In this process, the number of patient visits can be reduced, eliminating some traditional laboratory steps.
DDDS 024 Externship in Pediatric Dentistry
Credits 0.
This summer course introduces the student to the Advanced Education Program in Pediatric Dentistry; the delivery of dental care to medically and mentally compromised children and the delivery of dental care to children under various forms of sedation and general anesthesia. Participation in this selective course is by invitation only. Class is limited to 5 D4 students.

DDDS 025 Dental Ceramics
Credits 0.
This summer semester course introduces theory and fabrication of ceramo-metal and all-ceramic prosthodontic restorations. This selective does not require clinic, but does require 25 hours of lab. Class time and location to be announced by course director. Participation in this selective is by invitation only and restricted to D4 students.

DDDS 034 Dental Implantology
Credits 0. 1 Other Hour.
A clinical (treatment of patient who received dental implants), laboratory, surgical and restorative exercise. Familiarizes students with patient management of dental implants. This selective does require clinic time. Class time and location to be announced by course director. Class is limited to 12 D4 students per semester.

DDDS 042 Athletic Mouthguards
Credits 0. 1 Lab Hour.
Students attend seminars and fabricate athletic mouth guards for a community athletic team. This selective does not require clinic, but does require 15 hours of lab. The spring and summer course will be held on the 3rd and 6th floors. Class time and location to be announced by course director. Class is limited to 25 D3/D4 students only per semester.

DDDS 043 Tutoring Skills Seminar
Credits 0. 1 Lecture Hour.
This fall semester course will train students nominated by course directors to become effective peer tutors by developing skills in instructional technique. Class time and location to be announced by course director. Class is limited to D3/D4 students only.

DDDS 053 Secrets of Practice Success
Credits 0.
This summer/fall/spring course will teach, strengthen and reinforce behavioral skills that help dental teams build powerful interpersonal relationships with their patients, each other, their families and their communities as well as establish a patient-centered, preventively-oriented approach to practicing dentistry. This class is offered to D4 students.

DDDS 092 Craniofacial Research
Credits 0. 1 Other Hour.
This course is for research participants in the Short Term Training Program only. Provides students with an introduction to dental and craniofacial research and instill recognized values of biomedical research ethics.

DDDS 098 Dental Public Health
Credits 0.
This summer selective course offers observation of oral health care services for at least four days in a private dental office. This selective does not require class participation, is by invitation only and is limited to 50 D4 students.

DDDS 099 Public Health Sciences Community Preceptorship Program
Credits 0. 1 Other Hour.
This summer selective course offers observation and/or provision of oral health care services for at least four days in private practice, Indian Health Service, Veterans Administration hospital or other public health settings. This selective does not require clinic time. Class time and location to be announced by course director. Class participation is by invitation only and is limited to 30 D4 students.

DDDS 6510 Biochemistry/Cell and Molecular Biology
Credits 3. 3 Lecture Hours.
Chemical, metabolic cellular and molecular processes in the human body with applications to the practice of dentistry. Also includes cellular and molecular mechanisms that control gene expression and metabolic processes in human cells and tissues with an emphasis on dental examples.

DDDS 6520 Cariology and Prevention
Credit 1.5. 1.5 Lecture Hour.
(1.5-0). 5. Cariology, identification, progress, prevention and management of dental decay and tobacco-related oral disease; oral hygiene index and clinical utilization of plaque removal materials and techniques.

DDDS 6540 Dental Anatomy
Credits 2. 2 Lecture Hours.
Form and function of the human dentition.

DDDS 6543 Dental Anatomy-C
Credits 2. 2 Lab Hours.
Drawing and carving teeth to scale; restoring tooth form in wax to normal relation with adjacent and opposing teeth; identification of extracted natural teeth.

DDDS 6580 Dental Materials
Credit 1. 0.5 Lecture Hours. 0.5 Lab Hours.
(0.5-0.5). Introduction to the effects of physical, chemical and mechanical properties on the manipulation of materials used in dentistry; laboratory exercises to demonstrate clinical applications.

DDDS 6600 General Histology
Credits 3. 1.5 Lecture Hour. 1.5 Lab Hour.
(1.5-1.5). Microscopic and ultrastructural characteristics of cells, tissues and organ systems of the human; a brief introduction to function; light- and electron-microscopic study of human tissues.

DDDS 6640 Gross Anatomy
Credits 6. 3 Lecture Hours. 3 Lab Hours.
Gross morphology of the human with special emphasis on the head and neck; dissection of the cadaver.

DDDS 6660 Growth and Development
Credit 1.5. 1.5 Lecture Hour.
(1.5-0). 5. Prenatal growth of craniofacial structures; postnatal physical growth and maturation; development of the dentition and malocclusion; postnatal craniofacial development.

DDDS 6690 Human Behavior in Dentistry
Credits 0.5. 0.5 Lecture Hours.
(0.5-0). 5. Application of principles of communication and motivation relevant to doctor-patient relations, patient compliance, stress management, and management of dental anxiety and fear.
DDDS 6724 Introduction to Clinical Practice I-C
Credits 0.5. 0.5 Other Hours.
(0-0.5). 5. Observation and assistance of students in delivering dental services in preventive dentistry, oral diagnosis, periodontics and general dentistry, dental health education, patient interviewing, history taking and record management.

DDDS 6730 Introductory Ethics and Academic Integrity
Credits 0.5. 0.5 Lecture Hours.
(.5-0). 5. Contemporary introduction to ethics in the dental profession and academic integrity in dental education.

DDDS 6740 Immunology
Credit 1. 0.5 Lecture Hours. 0.5 Lab Hours.
(0.5-0). A lecture course to teach the basic principles of immunology as it relates to the practice of dentistry and the process of infectious disease.

DDDS 6770 Neuroscience
Credit 1.5. 1.5 Lecture Hour.
(1.5-0). 5. Gross structural features and functions of the human nervous system; emphasis on physiology of nerve membrane and receptors, neural pathways for the major sensory and motor systems; the cranial nerves; and the autonomics of the head and neck.

DDDS 6800 Occlusion
Credit 1. 1 Lecture Hour.
Temporomandibular joint occlusal function; intercuspal relationships; mandibular movements; record transfer; use of a semi-adjustable articulator.

DDDS 6804 Occlusion - C
Credit 1. 1 Lab Hour.
Preclinical laboratory to accompany course 6800.

DDDS 6820 Oral Histology
Credits 2. 1 Lecture Hour. 1 Lab Hour.
Normal development and structure of tissues associated with the tooth proper, its adnexa and the oral cavity; light-, scanning electron-, and transmission electron- microscopy; emphasis on clinical aspects of oral histology.

DDDS 6840 Operative Dentistry
Credit 1. 1 Lecture Hour.
Introduction to the treatment of diseased and injured teeth; emphasis on principles of cavity preparation; principles and manipulation of restorative materials.

DDDS 6844 Operative Dentistry - C
Credits 2. 2 Lab Hours.
Preclinical laboratory to accompany course 6840.

DDDS 6850 Cultural Competence in Dental Health Care and Education
Credits 0.5. 0.5 Lecture Hours.
(.5-0). 5. Explores cultural differences and similarities while increasing awareness of values and beliefs that impact health care and communication. Must be taken on a satisfactory/unsatisfactory basis.

DDDS 6860 Introduction to Evidence Based Dentistry and Clinical Research
Credits 2.5. 2.5 Lecture Hours.
(2.5-0) 5. Lecture and group sessions to introduce the functional principles of how to formulate a focused research question and how to search the literature to identify and evaluate evidence to answer that question.

DDDS 6870 Physiology
Credits 5.5. 2.8 Lecture Hours. 2.8 Lab Hours.
(2.75-2.75). 5. Theory and principles of human body function; detailed study of the cell membrane, skeletal muscle, blood, heart, lungs, gastrointestinal system, kidney and endocrine glands; demonstration of many principles in laboratory exercises.

DDDS 6880 General Pathology
Credits 4. 2 Lecture Hours. 2 Lab Hours.
This lecture course aimed at presenting the basic mechanisms on the organ systems of the body. It is also intended to provide an understanding of the more common diseases and, where appropriate, how they might impact the management of the dental patient.

DDDS 7010 Dental Auxiliary Utilization
Credits 0.5. 0.5 Lecture Hours.
(0.5-0). 5. Utilization of the chair-side dental assistant; self-study module.

DDDS 7020 Endodontics
Credit 1. 1 Lecture Hour.
Introduction to endodontics; technical and biological bases for nonsurgical root canal therapy; access, cleaning, shaping and filling of root canals.

DDDS 7024 Endodontics - C
Credit 1. 1 Lab Hour.
Preclinical laboratory; discussion and demonstrations of techniques for nonsurgical root canal therapy including access opening, cleaning, shaping and filling of root canals in models and extracted teeth.

DDDS 7040 Fixed Prosthodontics
Credits 3. 3 Lecture Hours.
Instruction in the design and fabrication of fixed partial dentures and crown restorations, implants, preparations, fabrication techniques and related dental materials.

DDDS 7044 Fixed Prosthodontics - C
Credits 4. 4 Lab Hours.
Laboratory to accompany course DDDS 7040.

DDDS 7080 Introduction to Clinical Practice II
Credit 1. 0.5 Lecture Hours. 0.5 Lab Hours.
Introduction to Clinical Practice II. (0.5-0.5). Introduction, orientation to the various clinical disciplines; concepts and implementation of quality assurance issues in dental practice, aseptic techniques, patient communications, diversity ethics, instrument management, initial introductory endodontics information, dental patient record management, rotations patient assignments, and culturally sensitive patient interviewing information.

DDDS 7084 Introduction to Clinical Practice II-C
Credit 1.5. 1.5 Other Hour.
(0-1.5). 5. Clinic applications to accompany course 7080; including rotations through various discipline clinics, several simulations of clinical operative procedures using computer documentation, small group sessions where students participate in simulated culturally sensitive patient interviewing exercises.

DDDS 7100 Operative Dentistry
Credit 1. 1 Lecture Hour.
Treatment of diseased and injured teeth; emphasis on principles of cavity preparation; principles and manipulation of restorative materials.

DDDS 7104 Occlusion - C
Credits 2. 2 Lab Hours.
Preclinical laboratory to accompany course 7100.
DDDS 7120 Basic Principles and Techniques of Dentoalveolar Surgery  
Credit 1. 0.5 Lecture Hours. 0.5 Lab Hours.  
(0.5-0.5). Introduction to the basic principles and techniques of dentoalveolar surgery; presurgical patient evaluation, risk management and assessment; surgical instrument identification and vocabulary; principles of soft tissue surgery, sterile techniques and infection control; preprosthetic surgical techniques.

DDDS 7140 Preclinical Diagnostic Sciences II  
Credit 1. 1 Lecture Hour.  
Introduction to clinical diagnostic methods and its vocabulary that contribute to the assessment of the dental patient. Techniques of gathering diagnostic information from the patient history, the extraoral physical examination and clinical laboratory studies.

DDDS 7160 Oral Pathology  
Credits 2. 2 Lecture Hours.  
Etiology, pathogenesis and clinical aspect of oral disease and oral manifestations of systemic disease.

DDDS 7170 Oral Radiology  
Credits 2. 2 Lecture Hours.  
The basic concepts of radiation physics, the generation of X-rays; operation of the X-ray unit; the control factors involved in the production of radiographic images, intraoral, extraoral and specialized radiographic acquisition techniques; and the radiographic interpretation of normal anatomy, dental caries, periodontal disease and dental anomalies.

DDDS 7173 Oral Radiography - C  
Credits 0.5. 0.5 Other Hours.  
(0-0.5). 5. Supervised practical experience in the application of the principles of radiographic image formation.

DDDS 7190 Preclinical Diagnostic Sciences II  
Credit 1. 1 Other Hour.  
Techniques and vocabulary that contribute to the diagnosis of dental diseases, abnormalities of teeth and non-dental lesions of the orofacial region. Physical and radiographic examination of oral/perioral tissues and the application of findings to diagnostic decisions are emphasized. Also, includes clinical documentation and dental treatment planning.

DDDS 7210 Basic Principles and Techniques of Dentoalveolar Surgery  
Credit 1. 1 Lecture Hour.  
Introductory information regarding evaluation of tooth position problems, treatment planning for minor orthodontic problems, including primary, mixed and adult dentitions. Diagnosis will be emphasized.

DDDS 7214 Orthodontics - C  
Credit 1. 1 Lab Hour.  
Basic techniques of wire and acrylic manipulation, including soldering, welding, band fabrication and bonding in a laboratory setting.

DDDS 7230 Local Anesthesia / Nitrous Oxide-Oxygen Conscious Sedation  
Credit 1. 0.5 Lecture Hours. 0.5 Other Hours.  
(0.5-0.5). Regional pain control; nitrous oxide-oxygen sedation and enteral conscious sedation, preanesthetic evaluation of patients, techniques of administration, pharmacology, side effects, complications and risk, and management of complications.

DDDS 7250 Pediatric Dentistry  
Credits 2. 1 Lecture Hour. 1 Lab Hour.  
An introductory course to pediatric dentistry presented in small-group seminars, preclinical laboratory basic operative skills, diagnosis and treatment planning, behavioral management strategies, an introductory patient experience activity, and observation of clinical treatment in preparation for the pediatric clinical courses.

DDDS 7270 Periodontics  
Credits 2. 2 Lecture Hours.  
Classification of periodontal disease, systemic and dysfunctional factors associated with periodontal disease, diagnosis and management of periodontal diseases, emphasis on specific therapeutic techniques.

DDDS 7274 Periodontics - C  
Credit 1. 0.5 Lab Hours. 0.5 Other Hours.  
Periodontics – C. (0.5-0.5). Clinical applications of course DDDS 7270.

DDDS 7290 Dental Pharmacology  
Credits 2. 2 Lecture Hours.  
Terms and principles essential to understanding the rational use of drugs in dental practice; pharmacology of drugs used in dentistry; prescription writing techniques; evaluation of patient drug histories.

DDDS 7330 Patient Management  
Credits 0.5. 0.5 Lecture Hours.  
(.5-0). 5. Scientific basis for oral disease assessment and strategies for prevention and/or management of oral diseases.

DDDS 7350 Removable Prosthodontics  
Credits 2. 2 Lecture Hours.  
Concepts and techniques for fabricating complete and partial dentures. Complete dentures fabricated on a manikin, theory of various denture occlusions; RPD design and construction, immediate dentures, restoration of implants, mouth preparation and laboratory communication.

DDDS 7353 Removable Prosthodontics - C  
Credits 4. 4 Lab Hours.  
Preclinical laboratory to accompany course DDDS 7350.

DDDS 7400 Application of Evidence Based Dentistry I  
Credits 0.5. 0.5 Other Hours.  
5. Small group sessions review clinically relevant articles using the foundational information from the first year evidence-based dentistry course.

DDDS 7410 National Dental Board Part I Review  
Credit 1. 1 Lecture Hour.  
Prepares discipline-based and case-based review material on the four sections of the NBDE including experience in taking practice examinations.

DDDS 7420 Microbiology  
Credits 3. 3 Lecture Hours.  
Microorganism metabolism, genetics, bacteriology, virology, mycology, chemotherapy, sterilization, disinfection, and the microorganisms of oral diseases.

DDDS 8000 Summer Clinic - C  
Credits 0. 0 Other Hours.  
All phases of clinic practice; mandatory attendance for third-year students.

DDDS 8004 Clinical Preventive Dentistry - C  
Credits 0.5. 0.5 Other Hours.  
(0-0.5). 5. Clinical applications of disease detection, risk assessment, behavioral modification and needs-based preventative measures.
DDDS 8034 Comprehensive Care Program - C  
**Credits 4. 4 Other Hours.**  
A clinical instruction and mentoring system with seminars that allows the student-clinician to learn to provide and coordinate patient care, as defined by clinical competencies, in a setting that simulates effectively managed dental practices that are patient centered and quality assured. It includes patient management skills, professionalism, ethics, time management, record and patient audits, work habits, treatment planning and other facets consistent with complete and socially sensitive patient care.

DDDS 8044 Dental Auxiliary Utilization - C  
**Credit 1. 1 Other Hour.**  
Utilization of chairside dental assistant, clinical applications.

DDDS 8060 Endodontics  
**Credit 1. 1 Lecture Hour.**  
Clinical endodontic; diagnosis and management of pulpal and periradicular disease; integration of pulp biology and clinical practice.

DDDS 8064 Endodontics – C  
**Credit 1. 1 Other Hour.**  
Clinical application of course DDDS 8060.

DDDS 8080 Fixed Prosthodontics  
**Credit 1.5. 1.5 Lecture Hour.**  
(1.5-0). 5. Biological, physiological, anatomical, and esthetic factors related to diagnosis, treatment planning and patient treatment.

DDDS 8084 Fixed Prosthodontics - C  
**Credits 3. 3 Other Hours.**  
Clinical application of course DDDS 8080.

DDDS 8140 Behavioral Dentistry/Dental Public Health  
**Credit 1. 1 Lecture Hour.**  
Behavioral management principles relevant to pain, anxiety, cultural background, etc. Management, treatment, prevention and disease control for geriatric patients. Motivational interviewing exercises for protection and management of oral health is taught. Dental public health and concepts of managing geriatric patients is included in the latter half of the course.

DDDS 8160 Anesthesia in Dentistry  
**Credits 0.5. 0.5 Lecture Hours.**  
(0.5-0). 5. Indications, contraindications, risks and techniques of enteral, parenteral and general anesthesia as applicable to dentistry.

DDDS 8180 Implant Dentistry  
**Credit 1. 0.5 Lecture Hours. 0.5 Lab Hours.**  
(0.5-0.5). Indications and evidence-based rationale for dental implants, diagnosis and treatment planning, surgical concepts of placement, prosthodontic restorative treatment for single tooth, partially edentulous and completely edentulous patients, and maintenance procedures.

DDDS 8200 Occlusion  
**Credit 1. 1 Lecture Hour.**  
Diagnosis and treatment of potentially pathologic and clinically pathologic occlusal conditions; etiologic factors; effects of pathofunction on oral tissues; diagnostic aids and methods of treatment.

DDDS 8204 Occlusion – C  
**Credit 1. 1 Other Hour.**  
Laboratory exercises to accompany course DDDS 8200.

DDDS 8220 Operative Dentistry  
**Credit 1.5. 1.5 Lecture Hour.**  
(1.5-0). 5. Clinical principles of operative dentistry, the art and science of treating diseased teeth; restoration of proper tooth form, function and esthetics.
DDDS 8360 Periodontics
Credit 1. 1 Lecture Hour.
Introduction to advanced periodontal techniques; periodontics as it relates to general practice and comprehensive case analysis, and treatment planning emphasizing periodontal literature and interdisciplinary concerns.

DDDS 8364 Periodontics - C
Credits 2. 2 Other Hours.
Clinical application of course DDDS 8360.

DDDS 8370 Professional Ethics
Credit 1. 1 Lecture Hour.
Principles and theory; case analysis and decision-making; humanizing health care; general ethics; obligations of health professionals; bioethics; review of dental-specific ethics literature; includes small group sessions.

DDDS 8380 Medical Pharmacology
Credit 1.5. 1.5 Lecture Hour.
(1.5-0). 5. Pharmacology of drugs used in medicine impacting dental patient evaluation and management. Focus is on fundamental drug information necessary for patient evaluation, the drug history and understanding potential adverse events, mechanisms of action, pharmacokinetics pharmacodynamics, and drug interactions with medications prescribed for dental procedures.

DDDS 8400 Removable Prosthodontics
Credit 1.5. 1.5 Lecture Hour.
(1.5-0). 5. Fabrication delivery and management of removable complete dentures, partial dentures and immediate dentures.

DDDS 8404 Removable Prosthodontics - C
Credits 3. 3 Other Hours.
Clinical application of course DDDS 8400.

DDDS 8500 Office Medical Emergencies
Credits 0.5. 0.5 Lecture Hours.
(0.5-0). 5. Prevention, recognition and management of medical emergencies; management of medically compromised patients.

DDDS 8600 Advanced Removable Prosthodontics
Credit 1. 1 Lecture Hour.
Extension of course DDDS 8400 with emphasis on advanced concepts for removable complete dentures, partial dentures, immediate dentures and prosthetic restoration of implants.

DDDS 8610 Periodontics
Credits 0.5. 0.3 Lecture Hours. 0.3 Lab Hours.
(0.25-0.25). 5. Intended to reinforce the principles of non-surgical management of periodontal disease and to better prepare for first clinical experiences; a review of periodontal hand instrumentation, infection control in the clinic and hands-on set-up and use of the Cavitron ultrasonic instrument; includes the relationship of periodontics and restorative dentistry and the proper usage of radiosurgery in dentistry.
Prerequisites: DDDS 7270 and DDDS 7274.

DDDS 9000 Summer Clinic
Credits 0.
All phases of clinical practice; mandatory attendance for fourth-year students.

DDDS 9004 Clinical Services Assignment - C
Credits 4.5. 4.5 Other Hours.
Clinical Services Assignment – C. (0-4.5). 5. Continuing clinical experience in selected specialties; emergency treatment in a practice setting; oral and maxillofacial surgery appropriate for general practice; oral diagnosis; treatment planning.

DDDS 9030 Diagnosis and Treatment Planning Seminar
Credit 1. 1 Lecture Hour.
Lecture and small group sessions familiarize students with “phase treatment planning,” interviewing patients, systemic disease issues, disease control, definitive treatment, maintenance and recall.

DDDS 9040 Advancements in Techniques and Materials
Credit 1.5. 1.5 Lecture Hour.
(1.5-0). 5. Innovations and advancements in dental materials and techniques; advantages and disadvantages; scientific basis for selection of materials and techniques.

DDDS 9044 General Dentistry - C
Credits 20. 20 Other Hours.
All phases of general dentistry performed as required for each assigned patient; seminars and student presentations. The General Dentistry program is inclusive of fixed prosthodontics, geriatrics, removable prosthodontics, operative dentistry, oral and maxillofacial surgery, oral diagnosis, orthodontics, pediatric dentistry, periodontics, endodontics, community health and preventive dentistry, oral radiography, and specialty care clinic.

DDDS 9050 Selected Advanced Topics in Oral And Maxillofacial Surgery
Credits 0.5. 0.3 Lecture Hours. 0.3 Lab Hours.
(0.25-0.25). 5. Emphasis is on more advanced and complex oral and maxillofacial surgical concepts more typically performed by the specialist in oral and maxillofacial surgery; extending the student’s capability for patient evaluation. Topics include major facial trauma, bone grafting, reconstruction of head and neck defects, orthognathics, life threatening infections and others.

DDDS 9070 Orthodontics
Credit 1. 1 Lecture Hour.
Comprehensive case analysis and treatment planning; role of the general dentist in detection, interception and treatment of orthodontic problems.

DDDS 9080 Community Dentistry Externship
Credits 0.5. 0.5 Other Hours.
(0-0.5). 5. Clinical experiences with historically underserved populations throughout a community dental center, the juvenile justice center, and other public health facilities.

DDDS 9090 Pediatric Dentistry
Credit 1. 1 Lecture Hour.
Lectures and small-group seminars, including child abuse, practice management, cleft lip/palate and case-based problem-solving exercises.

DDDS 9110 Applied Pharmacology
Credit 1. 1 Lecture Hour.
Pharmacology in dental practice; therapeutic use of drugs; toxicology; practice in evaluating patient drug histories with special emphasis on drug interactions in patients receiving multiple drug therapy.

DDDS 9120 Practice Administration
Credit 1. 1 Lecture Hour.
Associateships, other professional practice opportunities, purchasing existing practices; locating and financing a dental practice; taxes and insurance; management, staffing and delegation of duties marketing; Occupational Safety and Health Administration; stress management; third-party consideration.

DDDS 9140 Professional Ethics and Dental Jurisprudence
Credits 0.5. 0.5 Lecture Hours.
(.5-0). 5. Principles and theory, professional responsibility; case discussion and analysis/decision-making; humanizing health care; virtue ethics; legal aspects of dental practice; state board interactions and policies.
Courses

DDHS 3020 Theory of Dental Hygiene Practice I
Credits 2. 2 Lecture Hours.
Emphasis on advanced dental hygiene skills and services; provision of services to medically compromised patients.

DDHS 3110 Introduction To Dentistry
Credit 1. 1 Lecture Hour.
Introduction to dental hygiene as it relates to the dental specialties. Guest lecturers will describe what their specialty encompasses and the dental hygienist's role in that field of dentistry.

DDHS 3120 Dental Anatomy
Credits 2. 2 Lecture Hours.
Form and function of the primary and permanent human dentition; laboratory and seminar emphasis on morphology and comparisons of teeth.

DDHS 3160 Preclinical Dental Hygiene
Credits 6. 4 Lecture Hours. 0.5 Lab Hours. 8 Other Hours.
(4-.5-8). This course introduces the student to the foundational knowledge and skills needed to provide basic dental hygiene services. With faculty guidance, the student learns how to assess a patient's oral health needs, plan dental hygiene services to meet those needs, and implement and evaluate newly learned preventive and therapeutic procedures.

DDHS 3220 Oral Radiology
Credits 0 to 2. 2 Lecture Hours. 1 Lab Hour. 1 Other Hour.
This course is intended to provide the student with an understanding of the generation, properties, and techniques for use of X-rays in dentistry. The principles of radiation safety and health physics, interpretative recognition techniques and clinical patient management.

DDHS 3250 Biomedical Sciences I
Credits 5. 5 Lecture Hours. 0 Lab Hours.
Structure of the human body, including its anatomy, biochemistry, histology and physiology. Emphasis is placed on the structures of the head and neck region that surrounds the oral cavity.

DDHS 3310 Health Education and Behavioral Science
Credit 1. 1 Lecture Hour.
This course is designed to introduce the student to health education and behavioral science as it relates to educating patients and changing behaviors. Students will gain knowledge in evaluating and delivering educational services to culturally diverse populations.

DDHS 3325 Microbiology
Credits 2.5. 2.5 Lecture Hours. 0 Lab Hours.
(2.5-0). 5. A lecture course designed to teach the basic principles of medical microbiology, immunology and the infectious disease process.

DDHS 3340 Biomedical Sciences II
Credits 4. 4 Lecture Hours. 0 Lab Hours.
Structure of the human body, including its anatomy, biochemistry, histology and physiology. Emphasis is placed on the structures of the head and neck region that surrounds the oral cavity.

DDHS 3410 Introduction to Pathology
Credit 1. 1 Lecture Hour.
Introduction to Pathology is primarily a didactic lecture oriented course. Although clinically oriented, it is designed to provide a base of knowledge about pathologic processes and specific disease entities. Emphasis is on concepts and vocabulary essential to understanding basic pathologic processes: systemic pathology of organ systems and tissues; clinical manifestations that result from biological cellular alterations.
DDHS 3425 Health Promotion and Disease Prevention
Credits 2.5. 2.5 Lecture Hours.
(2.5-0). This course introduces the student to the etiology and prevalence of oral diseases and oral problems. The emphasis of the course is on the role of the dental hygienist in the promotion of optimal oral health, the prevention of oral diseases, and the importance of achieving and maintaining excellent personal oral health habits. The importance of and the techniques for educating the patient in self-care skills will also be examined.

DDHS 3530 Applied Dental Materials
Credits 3.2 Lecture Hours. 2.5 Lab Hours.
(2-2.5). Didactic, laboratory and clinical instruction in the principles of the science of dental materials and in procedures within the scope of dental hygiene practice.

DDHS 3830 Clinical Dental Hygiene I
Credits 3.9 Other Hours.
Comprehensive dental hygiene care through clinical application of procedures. Includes intramural dental hygiene and dental school rotations.

DDHS 4010 National Board Review
Credit 1.1 Lecture Hour.
Reviews applications of previous course content using a seminar format in preparation for the National Board Dental Hygiene Exam.

DDHS 4015 Pharmacology
Credit 1.5. 1.5 Lecture Hour.
(1.5-0). Actions, indications and contraindications of drugs; emphasis on drugs frequently encountered in dentistry.

DDHS 4025 Oral Pathology
Credits 2.5. 2.5 Lecture Hours.
(2-2.5). A didactic lecture oriented course. The lecture portion of the course, although, clinically oriented is designed to provide a base of knowledge about pathologic processes and specific disease entities. Diseases unique to the oral regions as well as oral manifestations of systemic disease will be covered. The Clinical Pathologic Conference (CPC) attempts to assimilate that information and apply it to relevant clinical situations in a case-based PDL format. Cases which illustrate a variety of clinical signs and symptoms will be presented with clinical histories. Students will be given the opportunity to develop a differential diagnosis and discuss the implications of this relevant to the patient’s treatment.

DDHS 4110 Medical Emergencies
Credits 0-1. 0-1 Lecture Hours.
Discussions on the preparations for handling emergencies; prevention, recognition and management of various emergencies. The course includes case scenario presentations and mock hands-on drills.

DDHS 4140 Clinical Dental Hygiene III
Credits 4.12 Other Hours.
(0-12). Comprehensive dental hygiene care through clinical application of procedures. Includes intramural dental hygiene and dental school rotations and extramural site rotations.

DDHS 4210 Professional Ethics
Credit 1.1 Lecture Hour.
The didactic lecture course and case-based small group decision making exercises draw from general ethics, bioethics, dental-specific ethics and obligations of health-care professionals.

DDHS 4220 Comprehensive Care Seminar
Credits 0 to 2. 0 to 2 Lecture Hours.
Topics and activities designed to integrate dental hygiene care with total patient care; includes a case presentation.

DDHS 4240 Clinical Dental Hygiene IV
Credits 4.12 Other Hours.
(0-12). Comprehensive dental hygiene care through clinical application of procedures. Includes intramural dental hygiene and dental school rotations and extramural site rotations.

DDHS 4310 Oral Radiography
Credits 0-1. 0-1 Other Hours.
Provides the student with clinical experience in the application of the principles, procedures and techniques of oral radiography.

DDHS 4320 Perspectives in Dental Hygiene
Credits 2.2 Lecture Hours.
In addition to preparing the student for private practice dental hygiene positions, this course introduces other potential career options including hospital/clinic administration, sales, consulting, public health, insurance and education. The importance of the dental team concept, résumé writing and interviewing skills will be discussed. Legal, ethical and professional issues involving record keeping, licensing, informed consent, sexual harassment and the standard of care will be explored. The business aspects of dental hygiene, personal financial planning, and insurance options will also be addressed. In addition, this course will prepare students for the Texas Jurisprudence Exam required for state licensure.

DDHS 4410 Gerontology
Credit 1.1 Lecture Hour.
This course will examine the unique considerations a dental professional will encounter when providing care to a geriatric patient. Social, psychological and biological aspects of aging will be discussed. Strategies for patient care will be outlined and discussed. Appropriate community referral agencies will be explored to aid the hygienist in providing assistance to the elderly patient.

DDHS 4510 Pediatric Dentistry
Credit 1.1 Lecture Hour.
Child development as the basis for management of behavior in the dental environment.

DDHS 4530 Public and Community Health
Credits 0 to 3. 0 to 3 Other Hours.
This course examines dental public health and pro-motes a greater understanding of the important role of the dental hygienist within the community. The student is exposed to opportunities to promote oral health and prevent dental diseases in the community through organized community-based programs versus the traditional clinical approach.

DDHS 4610 Periodontics
Credit 1.1 Lecture Hour.
Characteristics, etiology and treatment of inflammatory diseases of the supporting tissues of the teeth and their substitutes. Emphasis is placed on the relationship of periodontics to the practice of dental hygiene.

DDHS 4620 Theory of Dental Hygiene Practice II
Credits 2.2 Lecture Hours.
Fundamental knowledge and techniques in managing patients with special needs.

DDHS 4710 Applied Research Methods
Credit 1.1 Lecture Hour.
Practical experience in applying principles of research methodology; includes preparation of a formal proposal and table clinic under mentorship of individual faculty.
DDHS 4715 Research Methods
Credit 1.5. 1.5 Lecture Hour.
(1.5-0). 5. Identification of research problems and variables; sampling; research design; statistical testing of data; critical review of dental literature; table clinic development for presentation to the public and professional groups.

DDHS 4810 Local Anesthesia and Nitrous Oxide/Oxygen Sedation
Credit 1. 1 Lecture Hour.
The primary method of presentation is lecture, a detailed outline is provided to each student to facilitate the lecture or textbook notes to supplement the outline. Students are given outside assignments to practice dose calculations for each local anesthetic and for a variety of patients. The lecture material is supplemental with videotapes designed to show the correct administration techniques, the neural innervations of each area of the oral cavity and the area anesthetized.

DDHS 4820 Clinical Dental Hygiene II
Credits 2. 6 Other Hours.
Comprehensive dental hygiene care through clinical application of procedures. Includes intramural dental hygiene and dental school rotations and extramural site rotations.

ECEN - Electrical & Comp Engr

Courses

ECEN 214 Electrical Circuit Theory
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Resistive circuits: circuit laws, network reduction, nodal analysis, mesh analysis; energy storage elements; sinusoidal steady state; AC energy systems; magnetically coupled circuits; the ideal transformer; resonance; introduction to computer applications in circuit analysis.
Prerequisites: ENGR 111, ENGR 112, PHYS 208, CHEM 107, CHEM 117 with a grade of C or better; MATH 308 with a grade of C or better or registration therein; admission to electrical and computer engineering.

ECEN 215 Principles of Electrical Engineering
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Fundamentals of electric circuit analysis and introduction to electronics for engineering majors other than electrical and computer engineering.
Prerequisites: ENGR 111, ENGR 112, PHYS 208, CHEM 107, CHEM 117 with a grade of C or better; MATH 308 with a grade of C or better or registration therein; admission to an engineering major.

ECEN 222/CSCE 222 Discrete Structures for Computing
Credits 3. 3 Lecture Hours.
Provide mathematical foundations from discrete mathematics for analyzing computer algorithms, for both correctness and performance; introduction to models of computation, including finite state machines and Turing machines.
Prerequisite: MATH 151.
Cross Listing: CSCE 222/ECEN 222.

ECEN 248 Introduction to Digital Systems Design
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Combinational and sequential digital system design techniques; design of practical digital systems.
Prerequisite: ENGR 111, ENGR 112, PHYS 208, CHEM 107, CHEM 117, MATH 152 with a grade of C or better; admission to electrical and computer engineering.

ECEN 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Problems of limited scope approved on an individual basis intended to promote independent study.
Prerequisite: Approval of department head.

ECEN 289 Special Topics in...
Credits 1 to 4. 1 to 4 Other Hours.
Selected topics in an identified area of electrical engineering. May be repeated for credit.
Prerequisite: Approval of instructor.

ECEN 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in electrical engineering. May be repeated 3 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

ECEN 303 Random Signals and Systems
Credits 3. 3 Lecture Hours. 1 Lab Hour.
Concepts of probability and random variables necessary for study of signals and systems involving uncertainty; applications to elementary problems in detection, signal processing and communication.
Prerequisites: Grade of C or better in MATH 308; junior or senior classification.

ECEN 314 Signals and Systems
Credits 3. 3 Lecture Hours.
Introduction to the continuous-time and discrete-time signals and systems; time domain characterization of linear time-invariant systems; Fourier analysis; filtering; sampling; modulation techniques for communication systems.
Prerequisites: Grade of C or better in ECEN 214; MATH 308; junior or senior classification.

ECEN 322 Electric and Magnetic Fields
Credits 3. 3 Lecture Hours. 1 Lab Hour.
Vector analysis, Maxwell's equations, wave propagation in unbounded regions, reflection and refraction of waves, transmission line theory; introduction to waveguides and antennas.
Prerequisites: ECEN 214, PHYS 208, and MATH 311 with a grade of C or better; junior or senior classification.

ECEN 325 Electronics
Credits 4. 3 Lecture Hours. 4 Lab Hours.
Introduction to electronic systems; linear circuits; operational amplifiers and applications; diodes, field effect transistors, bipolar transistors; amplifiers and nonlinear circuits.
Prerequisite: MATH 311 with a grade of C or better; ECEN 314 with a grade of C or better, or registration therein.

ECEN 326 Electronic Circuits
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Basic circuits used in electronic systems; differential and multistage amplifiers; output stages and power amplifiers; frequency response, feedback circuits, stability and oscillators, analog integrated circuits, active filters.
Prerequisites: Grade of C or better in ECEN 314 and ECEN 325; junior or senior classification.
ECEN 338 Electromechanical Energy Conversion  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Introduction to magnetic circuits, transformers, electromechanical energy conversion devices such as dc, induction and synchronous motors; equivalent circuits, performance characteristics and power electronic control.  
Prerequisite: ECEN 214.

ECEN 350/CSCE 350 Computer Architecture and Design  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Computer architecture and design; use of register transfer languages and simulation tools to describe and simulate computer operation; central processing unit organization, microprogramming, input/output and memory system architectures.  
Prerequisites: Grade of C or better in ECEN 248; junior or senior classification.  

ECEN 370 Electronic Properties of Materials  
Credits 3. 3 Lecture Hours. 1 Lab Hour.  
Introduction to basic physical properties of solid materials; some solid state physics employed, but major emphasis is on engineering applications based on semiconducting, magnetic, dielectric and superconducting phenomena.  
Prerequisite: Grade of C or better in PHYS 222; junior or senior classification.

ECEN 403 Electrical Design Laboratory I  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Application of design process and project engineering as practiced in industry; team approach to the design process; development of a project proposal; proposed project implemented in ECEN 404.  
Prerequisites: COMM 205 or COMM 243 or ENGL 210; grade of C or better in ECEN 314, ECEN 325, ECEN 350/CSCE 350; grade of C or better in ECEN 303, ECEN 322, ECEN 370 or grade C or better in CSCE 315, ECEN 449, STAT 211 or ECEN 303; junior or senior classification.

ECEN 404 Electrical Design Laboratory II  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Continuation of ECEN 403; application of the design process and project engineering as practiced in industry; team approach to the design process; completion of project based on proposal from ECEN 403; includes testing, evaluation and report writing.  
Prerequisites: Grade of C or better in ECEN 403; junior or senior classification.

ECEN 405 Electrical Design Laboratory  
Credits 3. 1 Lecture Hour. 6 Lab Hours.  
Introduction to the design process and project engineering as practiced in industry; student teams apply the design process by developing a project from proposal through test and evaluation.  
Prerequisites: ENGL 210 or 301, completion of selected major field courses, junior or senior classification and project approval.

ECEN 410 Medical Imaging  
Credits 4. 3 Lecture Hours. 2 Lab Hours.  
Fundamentals of physics and the engineering principles of medical imaging systems; focus on magnetic resonance imaging, x-ray computer tomography, ultrasonography, optical imaging and nuclear medicine; includes systems, sources, energy tissue interaction, image formation and clinical examples; virtual labs, on- and off-campus lab tours.  
Prerequisites: Grade of C or better in MATH 222 or MATH 251 or MATH 253; ECEN 444 or grade of C or better in ECEN 314; junior or senior classification.

ECEN 411 Introduction to Magnetic Resonance Imaging and Magnetic Resonance Spectroscopy  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Introduction to the basic physics of magnetic resonance, the principles of MR imaging and spectroscopy, the major contrast mechanisms in MRI and MR imaging system hardware; development of pulse sequences for different imaging methods, including flow and spectroscopic imaging; will build RF coils.  
Prerequisites: Grade of C or better in MATH 251 and PHYS 208; junior or senior classification.

ECEN 412 Ultrasound Imaging  
Credits 3. 3 Lecture Hours.  
Mathematical analysis of wave propagation, scattering of ultrasound in biological tissues, electronic transducer arrays for the beam forming, models of the received signals and signal processing methods for medical ultrasound imaging of tissues; includes discussions of research related to fundamental ultrasound imaging concepts.  
Prerequisites: Grade of C or better in ECEN 314; junior or senior classification.

ECEN 414 Biosensors  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Hands-on lab experience in the development of miniaturized biosensors; includes microfluidic devices for biosensing.  
Prerequisite: Senior classification or approval of instructor.

ECEN 415 Physical and Economical Operations of Sustainable Energy Systems  
Credits 3. 3 Lecture Hours.  
Operational issues for sustainable electric energy systems; basic relevant topics in engineering, optimization and economic concepts; modular view of individual electric energy processing components; physical and market operations in electricity industry in support of sustainable energy integration; computer simulations and demonstrations to create and evaluate examples of power systems.  
Prerequisites: Grade of C or better in ECEN 214; ECEN 420; ECEN 460; junior or senior classification.

ECEN 419 Genomic Signal Processing  
Credits 3. 3 Lecture Hours.  
Fundamentals of molecular biology; application of engineering principles to systems biology; topics include unearthing intergene relationships, carrying out gene-based classification of disease, modeling genetic regulatory networks, and altering their dynamic behavior.  
Prerequisites: Grade of C or better in ECEN 314; junior or senior classification.

ECEN 420 Linear Control Systems  
Credits 3. 3 Lecture Hours.  
Application of state variable and frequency domain techniques to modeling, analysis and synthesis of single input, single output linear control systems.  
Prerequisites: Grade of C or better in ECEN 314 and MATH 308; junior or senior classification.

ECEN 421 Digital Control Systems  
Credits 3. 3 Lecture Hours.  
Feedback systems in which a digital computer is used to implement the control law; Z-transform and time domain methods serve as a basis for control systems design. Effects of computer word length and sampling rate.  
Prerequisite: ECEN 420 or equivalent.
Course Descriptions

ECEN 422 Control Engineering and Design Methodology
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Modeling, specifications, rating and operating principles of sensors, actuators and other control system components; experiments on conceptual design, simulation and physical implementation of control systems.
Prerequisite: ECEN 420 or equivalent.

ECEN 424 Fundamentals of Networking
Credits 3. 3 Lecture Hours.
Foundations of computer networking; layered architecture of the Internet, analysis of protocols, new-age networks such as the Web and social networks; computer network programming and offline analysis of real network data.
Prerequisites: Grade of C or better in ECEN 303 or STAT 211; junior or senior classification.

ECEN 425 Radio Frequency and Microwave Engineering
Credits 3. 3 Lecture Hours.
Fundamental Radio Frequency (RF) and microwave circuit analysis: scattering and ABCD matrices, return loss, insertion loss; transmission lines, lumped elements, impedance matching; theory, analysis and design of basic RF and microwave passive circuits; use of commercial CAD programs for RF and microwave circuit design and simulation.
Prerequisites: Grade of C or better in ECEN 322; junior or senior classification.

ECEN 434 Optimization for Electrical and Computer Engineering
Applications
Credits 3. 3 Lecture Hours.
Principles of optimization including linear and nonlinear optimization as well as electrical and computer engineering applications in signal estimation, routing in communication networks, flows in wireless networks, wafer fabrication plants, and economic dispatch in power systems.
Prerequisites: Grade of C or better in ECEN 322; junior or senior classification.

ECEN 438 Power Electronics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Electric power conditioning and control; characteristics of solid state power switches; analysis and experiments with AC power controllers, controlled rectifiers, DC choppers and DC-AC converters; applications to power supplies, airborne and spaceborne power systems.
Prerequisite: Junior or senior classification in electrical engineering or approval of instructor.

ECEN 440 Introduction to Thin Film Science and Technology
Credits 3. 3 Lecture Hours. 1 Lab Hour.
The course focuses on the thin film technology in semiconductor industry; topics include the basic growth mechanisms for thin films (growth models, lattice matching epitaxy and domain matching epitaxy), the instrumental aspects of different growth techniques and advanced topics related to various applications.
Prerequisites: Junior or senior classification.

ECEN 441 Electronic Motor Drives
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Application of semiconductor switching power converters to adjustable speed DC and AC motor drives; steady state theory and analysis of electric motion control in industrial, robotic and traction systems; laboratory experiments in power electronic motor drives and their control.
Prerequisite: Junior or senior classification in electrical engineering.

ECEN 442 DSP Based Electromechanical Motion Control
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Overview of energy conversion and basic concepts on electromechanical motion devices; different control strategies including the solid-state drive topologies; for every electromechanical motion device, its DSP control implementation discussed and implemented in the lab.
Prerequisites: Grade of C or better in ECEN 314; junior or senior classification.

ECEN 444 Digital Signal Processing
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Digital signal processing; discrete-time signals and systems, linear shift-invariant systems, the discrete Fourier transform and fast Fourier transform algorithm, and design of finite impulse response and infinite impulse response digital filters.
Prerequisites: Grade of C or better in ECEN 314; junior or senior classification.

ECEN 445 Applied Electromagnetic Theory
Credits 3. 3 Lecture Hours.
Guided wave and wireless methods; applications of Maxwell’s equations and electromagnetic wave phenomena to radiation, antennas and microwave circuit design; digital transmission line analysis and design.
Prerequisites: Grade of C or better in ECEN 322; junior or senior classification.

ECEN 447 Digital Image Processing
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Improvement of pictorial information using spatial and frequency domain techniques; two-dimensional discrete Fourier transform; image filtering, enhancement, restoration, compression; image processing project.
Prerequisites: Grade of C or better in ECEN 314; junior or senior classification.

ECEN 448 Real-Time Digital Signal Processing
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Features and architectures of digital signal processing (DSP) chips; fundamental compromises amongst computational accuracy, speed and cost; real-time implementation of filtering, audio, image and video processing algorithms; rapid prototyping via MATLAB/Simulink.
Prerequisites: ECEN 444; junior or senior classification.

ECEN 449 Microprocessor Systems Design
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Introduction to microprocessors; 16/32 bit single board computer hardware and software designs; chip select equations for memory board design, serial and parallel I/O interfacing; ROM, static and dynamic RAM circuits for no wait-state design; assembly language programming, stack models, subroutines and I/O processing.
Prerequisites: Grade of C or better in ECEN 248; junior or senior classification.

ECEN 451 Antenna Engineering
Credits 3. 3 Lecture Hours.
Introduction to antenna theory and design; includes antenna performance parameters, analysis of radiation from sources using Maxwell's equations, theory and design of wire antennas, arrays and frequency independent antennas; computer methods for antenna design.
Prerequisite: Grade of C or better in ECEN 322; junior or senior classification.
ECEN 452 Ultra High Frequency Techniques
Credits 3.2 Lecture Hours. 3 Lab Hours.
Introduction to theory and practice of ultra high frequency radio wave generation, transmission and radiation; application of Maxwell's equations to transmission of electrical energy in wave guides.
Prerequisites: ECEN 322; ECEN 351 or registration therein.

ECEN 453 Microwave Solid-State Circuits and Systems
Credits 3.3 Lecture Hours.
Microwave solid-state devices and circuits: theory and design of various types of active circuits; applications of these devices and circuits in radar, communication and surveillance systems.
Prerequisites: Grade of C or better in ECEN 322; junior or senior classification.

ECEN 454 Digital Integrated Circuit Design
Credits 3.2 Lecture Hours. 2 Lab Hours.
Analysis and design of digital devices and integrated circuits using MOS and bipolar technologies and computer aided simulation.
Prerequisites: Grade of C or better in ECEN 214 and ECEN 248; junior or senior classification.

ECEN 455 Digital Communications
Credits 4.3 Lecture Hours. 3 Lab Hours.
Digital transmission of information through stochastic channels; analog-to-digital conversion, entropy and information, Huffman coding; signal detection, the matched-filter receiver, probability of error; baseband and passband modulation, signal space representation of signals, PAM, QAM, PSK, FSK; block coding, convolutional coding; synchronization; communication through fading channels; spread-spectrum signaling; simulation of digital communication systems.
Prerequisites: Grade of C or better in ECEN 314; junior or senior classification.

ECEN 457 Operational Amplifiers
Credits 4.3 Lecture Hours. 3 Lab Hours.
Analysis of basic operational amplifier and operational transconductance amplifier (OTA) circuits; noise analysis in Op amp and OTA circuits; nonlinear OTA and Op amp circuits; instrumentation amplifiers; transducer circuits; function generators; oscillators and D/A converters and basics of switched-capacitor circuits.
Prerequisite: Grade of C or better in ECEN 325; junior or senior classification.

ECEN 458 Active Filter Analysis and Design
Credits 4.3 Lecture Hours. 3 Lab Hours.
Systematic analysis and design for active RC filters; continuous-time; switched-capacitor circuits; filter approximations; synthesis techniques; sensitivity; practical considerations for monolithic integrated filters; experimental and computer-simulation verification.
Prerequisite: Grade of C or better in ECEN 325; junior or senior classification.

ECEN 459 Power System Fault Analysis and Protection
Credits 4.3 Lecture Hours. 2 Lab Hours.
General considerations in transmission and distribution of electrical energy as related to power systems; calculation of electric transmission line constants; general theory of symmetrical components and application to analysis of power systems during fault conditions.
Prerequisite: Grade of C or better in ECEN 215 or ECEN 314; junior or senior classification.

ECEN 460 Power System Operation and Control
Credits 4.3 Lecture Hours. 2 Lab Hours.
Load flow studies; power system transient stability studies; economic system loading and automatic load flow control.
Prerequisite: Grade of C or better in ECEN 215 or ECEN 314; junior or senior classification.

ECEN 462 Optical Communication Systems
Credits 3.3 Lecture Hours.
Principles of optical communication systems; characteristics of optical fibers, lasers and photodetectors for use in communication systems; design of fiber-optic digital systems and other optical communication systems.
Prerequisites: Grade of C or better in ECEN 322 and ECEN 370; junior or senior classification.

ECEN 463/BMEN 427 Magnetic Resonance Engineering
Credits 3.2 Lecture Hours. 3 Lab Hours.
Design, construction and application of instrumentation for MR imaging; fundamentals of the architecture of an MR spectrometer and the gradient subsystem used for image localization; emphasis on the radiofrequency sensors and systems used for signal generation and reception.
Prerequisites: BMEN 420 or ECEN 410 or ECEN 411 or approval of instructor; junior or senior classification.
Cross Listing: BMEN 427.

ECEN 464 Optical Engineering
Credits 3.3 Lecture Hours.
Ray optics; wave optics; propagation, reflection, refraction and diffraction of light; passive optical components, polarization, optical modulators, interferometers and lasers.
Prerequisites: Grade of C or better in ECEN 322 and ECEN 370; junior or senior classification.

ECEN 465 Experimental Optics
Credits 4.2 Lecture Hours. 7 Lab Hours.
In-depth study of experimental optic techniques; opto-mechanical assemblies; passive optics; interferometers; opto-electronics; basic op-amp circuits; feedback and control of optics with electronics.
Prerequisite: Junior or senior classification or approval of instructor.

ECEN 466 Advanced Digital System Design
Credits 4.3 Lecture Hours. 3 Lab Hours.
Design, modeling and verification of complex digital systems using hardware description language and electronic system level language.
Prerequisite: Grade of C or better in ECEN 248; junior or senior classification.

ECEN 467 Microelectronic Circuit Fabrication
Credits 4.3 Lecture Hours. 3 Lab Hours.
Fundamentals of MOS and bipolar microelectronic circuit fabrication; theory and practice of diffusion, oxidation, ion implantation, photolithography, etch; yield and reliability considerations; statistical process control; integrated process design, simulation and characterization.
Prerequisites: Grade of C or better in ECEN 325 and ECEN 370; junior or senior classification.
ECEN 473 Microelectronic Device Design
Credits 3. 3 Lecture Hours.
General processes for the fabrication of microelectronic devices and integrated circuits; a review of the electronic properties of semiconductors and carrier transport and recombination; analysis and characterization of p-n junctions, bipolar transistors, and MOS capacitors and transistors; design considerations for achieving optimum performance and practical structures are discussed.
Prerequisites: Grade of C or better in ECEN 325 and ECEN 370; junior or senior classification.

ECEN 474 VLSI Circuit Design
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Analysis and design of monolithic analog and digital integrated circuits using NMOS, CMOS and bipolar technologies; device modeling; CAD tools and computer-aided design; design methodologies for LSI and VLSI scale circuits; yield and economics; test and evaluation of integrated circuits.
Prerequisite: ECEN 326.

ECEN 475 Introduction to VLSI Systems Design
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Introduction to design and fabrication of microelectronic circuits; emphasis on very large scale integration (VLSI) digital systems; use of state-of-the-art design methodologies and tools; design of small to medium scale integrated circuits for fabrication.
Prerequisites: Grade of C or better in ECEN 248 and ECEN 325; junior or senior classification.

ECEN 477 Photonics: Fiber and Integrated Optics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Photonics lab including optical power and spectral measurements of singlemode and multimode optical fibers, hands-on arc fusion splicing, lasers, amplifiers, interferometers, photodetectors, integrated optics, fiber-optic devices, optical modulators.
Prerequisite: Grade of C or better in ECEN 248 and ECEN 325; junior or senior classification.

ECEN 478 Wireless Communications
Credits 3. 3 Lecture Hours.
Overview of wireless applications, models for wireless communication channels, modulation formats for wireless communications, multiple access techniques, wireless standards.
Prerequisites: ECEN 455; junior or senior classification.

ECEN 480 RF and Microwave Wireless Systems
Credits 3. 3 Lecture Hours.
Introduction to various RF and microwave system parameters, architectures and applications; theory, implementation, and design of RF and microwave systems for communications, radar, sensor, surveillance, navigation, medical and optical applications.
Prerequisite: Grade of C or better in ECEN 322; junior or senior classification.

ECEN 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Problems of limited scope approved on an individual basis intended to promote independent study.
Prerequisites: Senior classification; approval of department head.

ECEN 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 7 Lab Hours.
Selected topics in an identified area of electrical engineering. May be repeated for credit.
Prerequisite: Approval of instructor.

ECEN 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in electrical engineering. May be repeated 3 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor.

ECEN 600 Experimental Optics
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Hardware, electronic interfaces, and experimental techniques for optics including optical mechanics, component mounting techniques, passive optical components, interferometers and precision alignment, basic electronics including op amps, active optical elements such as acousto-optics, servos in optics, laser intensity stabilization, lock-in amplifier and frequency stabilization.
Prerequisite: Approval of instructor.

ECEN 601 Linear Network Analysis
Credits 3. 3 Lecture Hours.
Signal theory treatment of continuous and discrete signals and systems; vector spaces, projection and sampling theories, Fourier, Laplace and Z Transforms.

ECEN 602 Computer Communication and Networking
Credits 3. 3 Lecture Hours.
Computer communication and computer networks; use of the International Standards Organization (ISO) seven-layer Open Systems Interconnection model as basis for systematic approach; operational networks to be included in the study of each layer; homework assignments to make use of a campus computer network.
Prerequisite: ECEN 646 or equivalent probability background.

ECEN 603 Time-frequency Analysis and Multirate Signal Processing
Credits 3. 3 Lecture Hours.
Basic functions; short-time Fourier transform; Gabor transform; linear time-scale/time-frequency analysis; time-frequency resolution; Wigner-Ville distribution; Ambiguity function; wavelet series; multi-rate filter bank; orthogonality and biorhorthogonality; subband coding and pattern recognition.

ECEN 604 Channel Coding for Communications Systems
Credits 3. 3 Lecture Hours.
Channel coding for error control, finite field algebra, block codes, cyclic codes; BCH codes; and convolutional codes; Trellis coded modulation, including ungerboeck codes and coset codes; performance on gaussian and rayleigh channels; applications to communications systems.
Prerequisites: Approval of instructor and graduate classification.

ECEN 605 Linear Control Systems
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Application of state variable and complex frequency domain techniques to analysis and synthesis of multivariable control systems.
Prerequisite: ECEN 420 or equivalent.

ECEN 606 Nonlinear Control Systems
Credits 3. 3 Lecture Hours.
Techniques available to analyze and synthesize nonlinear and discontinuous control systems. Modern stability theory, time-varying systems, DF, DIDF, Lyapunov Theory, adaptive control, identification and design principles for using these concepts; examples from a variety of electronic and electromechanical systems.
Prerequisite: ECEN 605.
ECEN 607 Advanced Analog Circuit Design Techniques  
Credits 4.3 Lecture Hours. 2 Lab Hours.  
Design of analog circuits using conventional and non-conventional voltage techniques, including floating gate, bulk driven and enhanced wide swing structures.  
Prerequisite: ECEN 474 or approval of instructor.

ECEN 608/MEEN 674 Modern Control  
Credits 3.3 Lecture Hours.  
Vector Norms; Induced Operator Norms; Lp stability; the small gain theorem; performance/robustness trade-offs; L1 and Hoo optimal P control as operator norm minimization; H2 optimal control.  
Prerequisite: ECEN 605 or equivalent.  
Cross Listing: MEEN 674/ECEN 608.

ECEN 609/MEEN 675 Adaptive Control  
Credits 3.3 Lecture Hours.  
Basic principles of parameter identification and parameter adaptive control; robustness and examples of instability; development of a unified approach to the design of robust adaptive schemes.  
Prerequisite: ECEN 605 or approval of instructor.  
Cross Listing: MEEN 675/ECEN 609.

ECEN 610 Mixed-Signal Interfaces  
Credits 4.3 Lecture Hours. 2 Lab Hours.  
Mixed-Signal Interfaces. Analog-to-digital and digital-to-analog converter architectures including Nyquist rate and oversampled converters; definition of basic data converter specifications and figures of merit; background and foreground calibration techniques to improve performance of data converters; low-power (green topologies) data converters design; state of the art mixed-signal interfaces such as transmitters and receivers front-ends in wireless and wireline communications transceivers; introduction to calibration techniques for digitally-assisted transceivers.  
Prerequisite: ECEN 474 or approval of instructor.

ECEN 611 General Theory of Electromechanical Motion Devices  
Credits 3.3 Lecture Hours.  
Winding function theory; inductances of an ideal doubly cylindrical machine; inductances of salient-pole machines, reference frame and transformation theory; dynamic equations of electric machines; steady-state behavior of electric machines.  
Prerequisite: Approval of instructor or graduate classification.

ECEN 612 Computer Aided Design of Electromechanical Motion Devices  
Credits 4.3 Lecture Hours. 3 Lab Hours.  
Magnetic circuits and field distribution of electric machines; main flux path calculation; calculation of magnetizing and leakage inductance; calculation of electric machine losses; principle of design of various electric machines; finite element design of electromechanical motion devices.  
Prerequisite: Approval of instructor or graduate classification.

ECEN 613 Rectifier and Inverter Circuits  
Credits 3.3 Lecture Hours.  
Analysis/design of single phase, three phase rectifiers; phase control and PWM rectifiers; line harmonics; power factor; harmonic standards; passive and active correction methods; inverters; PWM methods; effect of blanking time; zero voltage switching and multilevel inverter; application of these systems in UPS and AC motor drives.  
Prerequisite: ECEN 438 or approval of instructor.

ECEN 614 Power System State Estimation  
Credits 3.3 Lecture Hours.  
The large electric power system state estimation problem; issues of network observability; bad measurements detection/identification; sparse matrix vector techniques for computational efficiency.  
Prerequisite: ECEN 460.

ECEN 615 Methods of Electric Power Systems Analysis  
Credits 3.3 Lecture Hours.  
Digital computer methods for solution of the load flow problem; load flow approximations; equivalents; optimal load flow.  
Prerequisite: ECEN 460 or approval of instructor.

ECEN 616 Power System Electromagnetic Transients  
Credits 3.3 Lab Hours.  
Modeling of power system components for electromagnetic transient studies; digital computer methods for computation of transients.  
Prerequisites: ECEN 459 and ECEN 460.

ECEN 617 Advanced Signal Processing for Medical Imaging  
Credits 3.3 Lecture Hours.  
This is a graduate-level course covering several advanced signal processing topics in medical imaging: multi-dimensional signal sampling and reconstruction, bio-signal generation and optimal detection, Fourier imaging, Radon transform-based tomographic imaging, multi-channel signal processing, as well as constrained reconstruction, rapid imaging, image segmentation, registration and analysis.  
Prerequisite: Approval of the instructor.

ECEN 619 Internet Protocols and Modeling  
Credits 3.3 Lecture Hours.  
Wide spectrum of Internet protocols that make it work; analytical capabilities to evaluate the performance of complex Internet protocols; aspects of the Internet protocols, including principles, design and implementation, and performance modeling and analysis; core components of Internet protocols such as transport (TCP, UDP), network and routing (IP, RIP, OSPF, EGP, BGP-4, etc.)  
Prerequisite: Approval of instructor.

ECEN 620 Network Theory  
Credits 3.3 Lecture Hours.  
Development and application of advanced topics in circuit analysis and synthesis in both the continuous and discrete time and frequency domains.  
Prerequisite: ECEN 326 or equivalent.

ECEN 621 Mobile Wireless Networks  
Credits 3.3 Lecture Hours.  
Foundations of advanced mobile wireless networks, how they are designed, and how well they perform. Topics include fundamentals on mobile wireless networks, TCP/IP over wireless links, fading-channel modeling, CDMA, OFDM, MIMO, error control, IEEE 802.11 protocols, cross-layer optimization, wireless QoS, mobile multicast, VANETs, wireless-sensor networks, wireless networks security.  
Prerequisites: Basic-level "Computer Networks" class or consent of instructor.

ECEN 622 Active Network Synthesis  
Credits 3.3 Lecture Hours.  
Methods of analyzing and synthesizing active networks; sensitivity analysis, methods of rational fraction approximation, OPAMP modeling and stability.  
Prerequisite: ECEN 457 or equivalent.
ECEN 625 Millimeter-wave Integrated Circuits
Credits 3.3 Lecture Hours.
Applications of millimeter-wave integrated circuits for wireless transceiver; principles of operation, modeling, design and fabrication of the most common millimeter-wave CMOS, SiGe and RF MEMS circuits.
Prerequisite: Graduate classification; approval of instructor.

ECEN 628 Linear System Theory
Credits 3.3 Lecture Hours.
Application of functional analysis and geometric concepts to the analysis and synthesis of control systems.
Prerequisite: ECEN 605.

ECEN 629 Convex Optimization for Electrical Engineering
Credits 3.3 Lecture Hours.
Introduction of convex optimization including convex set, convex functions, convex optimization problems, KKT conditions and duality, unconstrained optimization, and interior-point methods for constrained optimization; specific application examples in communication/information theory, signal processing, circuit design, and networking, which are based on state-of-art research papers.
Prerequisites: Linear Algebra (familiar with operations over vectors and matrices).

ECEN 630 Analysis of Power Electronic Systems
Credits 3.3 Lecture Hours.
Analysis and control of semiconductor switching power converters using specialized methods such as Fourier series, state-space averaging, time domain transfer functions, sliding mode, quadrumerics and other discontinuous orthogonal functions; application of the above techniques in practice; selected research publications.
Prerequisite: Approval of instructor.

ECEN 631 Fiber-Optic Devices
Credits 3.3 Lecture Hours.
Fiber optic waveguides; directional couplers; polarization; poincare sphere fractional wave devices; PM fiber; interferometric devices and sensors fiber gyroscope; faraday effect devices; multiplexing techniques.
Prerequisite: Approval of instructor.

ECEN 632 Motor Drive Dynamics
Credits 3.3 Lecture Hours.
Mathematical analysis of adjustable speed motor drive dynamics; direct torque control in dc and ac machines; the theory of field orientation and vector control in high performance ac motor drives; motion control strategies based on the above theories; microcomputer, signal and power circuit implementation concepts.
Prerequisite: Approval of instructor.

ECEN 633 Optimum Control Systems
Credits 3.3 Lecture Hours.
Variational approach to the development of algorithms for the solution of optimum control problems; necessary and sufficient conditions, numerical methods, and analysis and comparison of optimal control results to classical theory.
Prerequisite: ECEN 605.

ECEN 635 Electromagnetic Theory
Credits 3.3 Lecture Hours.
Maxwell's equations, boundary conditions, Poynting's theorem, electromagnetic potentials, Green's functions, Helmholtz's equation, field equivalence theorems; applications to problems involving transmission scattering and diffraction of electromagnetic waves.
Prerequisites: ECEN 322; ECEN 351 or equivalent.

ECEN 636 Phased Arrays
Credits 3.3 Lecture Hours.
Theory and application of phased array antennas, radiators and sensors; spatial and spectral domain analysis of phased arrays including element-by-element, infinite array and Fourier methods; applications will include phased arrays, adaptive arrays, and synthesis array antennas; for use in radar, imaging and biomedical treatment and diagnosis.
Prerequisite: ECEN 322 or equivalent.

ECEN 637 Numerical Methods in Electromagnetics
Credits 3.3 Lecture Hours.
Numerical techniques for solving antenna, scattering and microwave circuits problems; finite difference and finite element differential equation methods with emphasis on the method of moments integral equation technique.
Prerequisites: ECEN 351 or ECEN 365; CSCE 203 or equivalent.

ECEN 638 Antennas and Propagation
Credits 3.3 Lecture Hours.
Application of Maxwell's equations to determine electromagnetic fields of antennas; radiation, directional arrays, impedance characteristics, aperture antennas.
Prerequisite: ECEN 351.

ECEN 639 Microwave Circuits
Credits 3.3 Lecture Hours.
Introduction to high frequency systems and circuits; provides background information needed to understand fundamentals of microwave integrated circuits; includes usage of S-parameters, Smith Charts, stability considerations in designing microwave circuits; utilizes CAD program "Super Compact" demonstrating design synthesis optimization and analysis of monolithic devices and circuits.
Prerequisite: Graduate classification.

ECEN 640 Thin Film Science and Technology
Credits 3.3 Lecture Hours.
Thin film technology in semiconductor industry; topics include the basic growth mechanisms for thin films (growth models, lattice matching epitaxy and domain matching epitaxy), the instrumental aspects of different growth techniques and advanced topics related to various applications.
Prerequisites: Graduate standing.

ECEN 641 Microwave Solid-State Integrated Circuits
Credits 3.3 Lecture Hours.
Microwave two-terminal and three-terminal solid-state devices; waveguide and microstrip solid-state circuits; theory and design of microwave mixers, detectors, modulators, switches, phase shifters, oscillators and amplifiers.
Prerequisite: ECEN 351.

ECEN 642 Digital Image Processing
Credits 3.3 Lecture Hours.
Digital Image Processing techniques; stresses filtering, transmission and coding; fast transform techniques; convolution and deconvolution of model noise.
Prerequisites: ECEN 447 and ECEN 601.

ECEN 643 Electric Power System Reliability
Credits 3.3 Lecture Hours.
Design and application of mathematical models for estimating various measures of reliability in electric power systems.
Prerequisite: ECEN 460 or approval of instructor.
ECEN 644 Discrete-Time Systems
Credits 3. 3 Lecture Hours.
Linear discrete time systems analysis using time domain and transform approaches; digital filter design techniques with digital computer implementations.
Prerequisite: ECEN 601.

ECEN 646 Statistical Communication Theory
Credits 3. 3 Lecture Hours.
Concepts of probability and random process theory necessary for advanced study of communications, stochastic control and other electrical engineering problems involving uncertainty; applications to elementary detection and estimation problems.
Prerequisite: Registration in ECEN 601 or approval of instructor.

ECEN 647 Information Theory
Credits 3. 3 Lecture Hours.
Definition of information; coding of information for transmission over a noisy channel including additive gaussian noise channels and waveform channels; minimum rates at which sources can be encoded; maximum rates at which information can be transmitted over noisy channels.
Prerequisite: ECEN 646 or equivalent probability background.

ECEN 648 Principles of Magnetic Resonance Imaging
Credits 3. 3 Lecture Hours.
Introduction to the theory and design of magnetic resonance imaging systems; fundamental physical and mathematical introduction to image acquisition and reconstruction using magnetic resonance; overview of imaging system design, including magnets, imaging gradients and radio-frequency systems, contrast mechanisms, resolution.
Prerequisite: ECEN 314 or ECEN 322 or approval of instructor.

ECEN 649 Pattern Recognition
Credits 3. 3 Lecture Hours.
Introduction to the underlying principles of classification, and computer recognition of imagery and robotic applications.
Prerequisites: MATH 601 and/or STAT 601 and approval of instructor.

ECEN 650 High Frequency GaAs/SiGe Analog IC Design
Credits 4. 3 Lecture Hours. 3 Lab Hours.
High frequency integrated circuit design using non-conventional technologies such as GaAs and SiGe, with the emphasis on wireless and broadband communication circuits. Device operation, basic building blocks and typical applications.
Prerequisite: ECEN 474 or approval of instructor.

ECEN 651 Microprogrammed Control of Digital Systems
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Hardware and software concepts involved in the design and construction of microprocessor-based digital systems; microprocessor architecture; bussing; interfacing; data input/output; memories; and software development for operation and testing; design projects with microprocessors and related components.
Prerequisites: ECEN 350/CSCE 350 and ECEN 449 or approval of instructor.

ECEN 653 Computer Arithmetic Unit Design
Credits 3. 3 Lecture Hours.
Digital computer arithmetic unit design, control and memory; microprocessor arithmetic logic unit (ALU) design. High-speed addition, subtraction, multiplication and division algorithms and implementations; design and simulation with integrated circuit components and VLSI circuits.
Prerequisite: ECEN 651.

ECEN 654 Very Large Scale Integrated Systems Design
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Design and fabrication of microelectronic circuits such as registers, selectors, PLAs, sequential and microprogrammed machines via large scale integrated circuitry with emphasis on high-level, structured design methods for VLSI systems; design small to medium scale integrated circuits for fabrication by industry.
Prerequisites: ECEN 454 or equivalent undergraduate VLSI course.

ECEN 655 Advanced Topics in Channel Coding
Credits 3. 3 Lecture Hours.
Advanced topics in Channel Coding including turbo codes, low density parity check codes, iterative decoding and applications of iterative decoding principles.
Prerequisite: ECEN 604 or graduate classification.

ECEN 658 Low-Noise Electronic Design
Credits 3. 3 Lecture Hours.
Low-noise design; surveying the subject of handling electronic noise from theory to measurement, design, research and developments.
Prerequisite: Approval of instructor.

ECEN 659/CSCE 659 Parallel/Distributed Numerical Algorithms and Applications
Credits 3. 3 Lecture Hours.
A unified treatment of parallel and distributed numerical algorithms; parallel and distributed computation models, parallel computation or arithmetic expressions; fast algorithms for numerical linear algebra, partial differential equations and nonlinear optimization.
Prerequisite: MATH 304 or equivalent.
Cross Listing: CSCE 659/ECEN 659.

ECEN 660 BioMEMS and Lab-on-a-Chip
Credits 3. 3 Lecture Hours.
Introduction to lab-on-a-chip technology; microfabrication techniques commonly used in BioMems device fabrication; microfluidics miniaturized systems for chemical and biomedical applications such as separation, diagnosis tools, implantable devices, drug delivery, and microsystems for cellular studies and tissue engineering; will gain a broad perspective in the area of miniaturized systems for biomedical and chemical applications.
Prerequisite: Approval of instructor.

ECEN 661 Modulation Theory
Credits 3. 3 Lecture Hours.
Optimum receiver principles and signal selection for communication systems with and without coding; system implementation, and waveform communication using realistic channel models.
Prerequisite: ECEN 654.

ECEN 662 Estimation and Detection Theory
Credits 3. 3 Lecture Hours.
Probabilistic signal detection theory and parameter estimation theory; Neyman-Pearson, UMP, and locally optimal tests; discrete time Markov processes and the Kalman and Wiener filters; bayesian, maximum likelihood and conditional mean estimation methods.
Prerequisite: ECEN 646.

ECEN 663 Data Compression with Applications to Speech and Video
Credits 3. 3 Lecture Hours.
Characterization and representation of waveforms; digital coding of waveforms including PCM, delta modulation, DPCM, tree/trellis coding, runlength coding, sub-band coding and transform coding; rate distortion theoretic performance bounds.
Prerequisites: ECEN 601 and ECEN 646.
ECEN 664 Nanotechnology Fabrication
Credits 3. 3 Lecture Hours.
Cutting edge nanostructure fabrication techniques for both top-down and bottom up approaches.
Prerequisite: Approval of instructor.

ECEN 665 Integrated CMOS RF Circuits and Systems
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Introduction to wireless communication systems at the theoretical, algorithmic and circuit levels; emphasis on simulation at the architecture, transistor levels of the communication systems; focus on circuits implementable on CMOS and BiCMOS technologies.
Prerequisites: ECEN 453, ECEN 456, ECEN 474.

ECEN 666 Power System Faults and Protective Relaying
Credits 3. 3 Lecture Hours.
Calculation of power system currents and voltages during faults; protective relaying principles, application and response to system faults.
Prerequisite: ECEN 460 or approval of instructor.

ECEN 667 Power System Stability
Credits 3. 3 Lecture Hours.
Steady-state, dynamic and transient stability of power systems; solution techniques; effect of generator control systems.
Prerequisite: ECEN 460 or approval of instructor.

ECEN 668 High Voltage Direct Current (HVDC) Transmission
Credits 3. 3 Lecture Hours.
Overview of HVDC systems; comparison of AC and DC power transmission; study of six-pulse and twelve-pulse power converters; analysis and control of HVDC systems; harmonics and power factor effects; system faults and misoperations; state of the art and future developments in HVDC technology; inspection trips.
Prerequisite: Approval of instructor.

ECEN 669 Engineering Applications in Genomics
Credits 3. 3 Lecture Hours.
Tutorial introduction to the current engineering research in genomics. The necessary Molecular Biology background is presented and techniques from signal processing and control are used to (i) unearth intergene relationships (ii) model genetic regulatory networks and (iii) alter their dynamic behavior.
Prerequisite: ECEN 605 or approval of instructor.

ECEN 670 Fiber Optic Networks
Credits 3. 3 Lecture Hours.
Components, topologies and architecture for communication networks based on the optical fiber transmission medium; examples based on recent publications in technical literature.
Prerequisite: Graduate classification.

ECEN 671 Solid State Devices
Credits 3. 3 Lecture Hours.
Development of mathematical analysis and systematic modeling of solid state devices; relationships of measurable electrical characteristics to morphology and material properties of solid state devices, p-n junction, bipolar and unipolar transistors.
Prerequisite: ECEN 656 or approval of instructor.

ECEN 674/PHYS 674 Introduction to Quantum Computing
Credits 3. 3 Lecture Hours.
Introduces the quantum mechanics, quantum gates, quantum circuits and quantum hardware of potential quantum computers; algorithms, potential uses, complexity classes, and evaluation of coherence of these devices.
Prerequisites: MATH 304, PHYS 208.
Cross Listing: PHYS 674/ECEN 674.

ECEN 675 Integrated Optoelectronics
Credits 3. 3 Lecture Hours.
Light propagation and interactions in anisotropic media; electrooptic and acoustooptic effects; passive and active guided-wave devices; fabrication and characterization.
Prerequisite: ECEN 464 or equivalent.

ECEN 676/CSEE 676 Advanced Computer Architecture
Credits 3. 3 Lecture Hours.
Design of advanced computers for parallel processing: emphasis on the overall structure; interconnection networks; including single-stage and multi-stage structures; shared memory and message passing architectures; control-flow and demand-driven programming; multithreaded architectures; fine-grain and coarse-grain parallelism; SIMD and MIMD; processor designs for parallel operation.
Prerequisite: ECEN 651 or CSCE 614 or approval of instructor.
Cross Listing: CSEE 676.

ECEN 677 Control of Electric Power Systems
Credits 3. 3 Lecture Hours.
Modeling, analysis and real-time control of electric power systems to meet the requirements of economic dispatch of voltage and power.
Prerequisite: Approval of instructor.

ECEN 679 Computer Relays for Electric Power Systems
Credits 3. 3 Lecture Hours.
Real-time digital computer application to protective relaying; extensive overview of digital protection algorithms; latest technological advancements as microprocessor-based relays, fiber-optic communication systems, unconventional instrument transformers, dynamic testing tools and methodologies.
Prerequisite: Approval of instructor.

ECEN 680/CSCE 680 Testing and Diagnosis of Digital Systems
Credits 3. 3 Lecture Hours.
The theory and techniques of testing VLSI-based circuits and systems, and design for testability.
Prerequisites: ECEN 220 or ECEN 248 or equivalent; ECEN 350/CSCE 350 or CSCE 321 or equivalent.
Cross Listing: CSCE 680/ECEN 680.

ECEN 681 Seminar
Credit 1. 1 Lecture Hour.
Reports and discussion of current research and of selected published technical articles. May be taken four times for credit.
Prerequisite: Graduate classification in electrical and computer engineering.

ECEN 683 Wireless Communication Systems
Credits 3. 3 Lecture Hours.
Wireless applications, modulation formats, wireless channel models and simulation techniques, digital communication over wireless channels, multiple access techniques, wireless standards.
Prerequisite: ECEN 646 or approval of instructor.

ECEN 684 Professional Internship
Credits 1 to 4. 1 to 4 Other Hours.
Engineering research and design experience at industrial facilities away from the Texas A&M campus; design projects supervised by faculty coordinators and personnel at these locations; projects selected to match student’s area of specialization.
Prerequisites: Graduate classification and one semester of coursework completed.
ECEN 685 Directed Studies
Credits 1 to 12. 1 to 12 Other Hours.
Research problems of limited scope designed primarily to develop research technique.

ECEN 686 Electric and Hybrid Vehicles
Credits 3. 3 Lecture Hours.
Fundamental concepts of electric and hybrid-electric vehicles introduced, component requirements and system design methodologies discussed; vehicle system analysis and simulation methodologies presented.
Prerequisite: Graduate classification or approval of instructor.

ECEN 687 Introduction to VLSI Physical Design Automation
Credits 3. 3 Lecture Hours.
Algorithms and techniques for VLSI design automation, including basic optimization techniques, high level synthesis, logic synthesis/verification, physical design, timing verification and optimization.
Prerequisite: ECEN 248.

ECEN 688 IC MEMS and Sensor Fabrication
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Fundamental unit processes for the fabrication of silicon IC’s and extension of these processes to the specialized micro-machining operations used for MEMS and sensor fabrication; basic process operations used in the laboratory to build simple IC structures; devices then characterized.
Prerequisite: ECEN 325, ECEN 370, or approval of instructor.

ECEN 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Advanced topics of current interest in electrical engineering. May be repeated for credit.
Prerequisite: Approval of instructor.

ECEN 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research for thesis or dissertation.

ECEN 694 Nanobiotechnology
Credits 3. 3 Lecture Hours.
Introduction to advances in nanobiotechnology; includes fabrication of micro or nano structures, molecular manipulation, medical diagnostic and treatment options, nano scale machines such as molecular motors for drug delivery.
Prerequisite: Graduate classification; approval of instructor.

ECEN 696 Erbium-Doped Amplifier: Technology and Applications
Credits 3. 3 Lecture Hours.
Prerequisite: ECEN 370 or approval of instructor.

ECEN 699 Advances in VLSI Logic Synthesis
Credits 3. 3 Lecture Hours.
Logic representation, manipulation, and optimization; combinational and sequential logic; Boolean function representation schemes; exact and heuristic two-level logic minimization; multi-valued logic representation and manipulation; multi-level logic representation and minimization; testing; technology mapping.
Prerequisites: Approval of instructor and graduate classification.

ECEN 704 VLSI Circuit Design
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Analysis and design of monolithic analog and digital integrated circuits using NMOS, CMOS and bipolar technologies; device modeling; CAD tools and computer-aided design; design methodologies for LSI and VLSI scale circuits; yield and economics; test and evaluation of integrated circuits.
Prerequisite: Graduate classification.

ECEN 710 Switching Power Supplies
Credits 3. 3 Lecture Hours.
Operating principles of switching power supplies; analysis and in-depth design of several types of switching regulators including buck, boost, forward, flyback, half and full bridge switching regulator analysis; elements of transformer and magnetic design; state space analysis and feedback loop stabilization principles; application of these in the industry.
Prerequisites: ECEN 438 or equivalent, approval of instructor.

ECEN 711 Sustainable Energy and Vehicle Engineering
Credits 3. 3 Lecture Hours.
Forms of sustainable and unsustainable energy resources and the basic system engineering limits of each; specific problems of sustainable transportation energy on the bases of vehicle and power engineering; issues related to energy efficiency, life cycle analysis, global warming, pollution, economic and social considerations.
Prerequisite: Graduate classification in engineering.

ECEN 712 Power Electronics for Photovoltaic Energy Systems
Credits 3. 3 Lecture Hours.
Sustainable energy sources such as photovoltaic, fuel cell, wind, and others require power electronics to perform energy conversion and conditioning in order to convert their native form of electrical generation to a format compatible with the ac utility grid; exploration of the salient electrical characteristics of solar photovoltaic sources, the requirements for grid-connection and the power electronic circuits and controls needed to perform the interconnection and control.
Prerequisite: ECEN 438 or instructor approval.

ECEN 714 Digital Integrated Circuit Design
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Analysis and design of digital devices and integrated using MOS and bipolar technologies and computer aided simulation.
Prerequisite: Graduate classification.

ECEN 715 Physical and Economical Operations of Sustainable Energy Systems
Credits 3. 3 Lecture Hours.
Operational issues for sustainable electric energy systems; basic relevant topics in engineering, optimization and economic concepts; modular view of individual electric energy processing components; physical and market operations in electricity industry in support of sustainable energy integration; computer simulations and demonstrations to create and evaluate examples of power systems.
Prerequisite: ECEN 214, ECEN 420, ECEN 460 or approval of instructor.

ECEN 720 High-Speed Links Circuits and Systems
Credits 4. 3 Lecture Hours. 3 Lab Hours.
System and circuit design of high-speed electrical and optical link systems; includes channel properties, communication techniques, and circuit design of drivers, receivers, equalizers, and synchronization systems; project consists of link design with a statistical bit error rate simulator and interface circuit design.
Prerequisite: ECEN 474.
ECEN 730 CMOS RFIC Engineering  
Credits 3. 3 Lecture Hours.  
Introduction to CMOS radio-frequency integrated circuits (RFICs) and wireless systems and networks; theory, analysis and design of RFICs using CMOS technologies; CMOS fundamentals (device, principle, models); scattering parameters, transmission lines, distributed structures, lumped elements, impedance matching, RFIC layout, processing, test, amplifiers, oscillators, mixers; CAD programs for CMOS RFIC design. 
Prerequisites: ECEN 322 and graduate classification.

ECEN 735 Electromagnetic Field Theory  
Credits 3. 3 Lecture Hours.  
Methods in wave propagation, diffraction and scattering analysis, including surface waves, creeping waves, surface plasmons and complex environments; applications to macroscopic and nano technology such as optical wave propagation in materials and wireless device wave propagation. 
Prerequisite: ECEN 635 or equivalent.

ECEN 741 Electronic Motor Drives  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Application of semiconductor switching power converters to adjustable speed DC and AC motor drives; steady state theory and analysis of electric motion control in industrial, robotic and traction systems; laboratory experiments in power electronic motor drives and their control. 
Prerequisite: Graduate classification.

ECEN 749 Microprocessor Systems Design  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Introduction to microprocessors; 16/32 bit single board computer hardware and software designs; chip select equations for memory board design, serial and parallel I/O interfacing; ROM, static and dynamic RAM circuits for no wait-state design; assembly language programming, stack models, subroutines, and I/O processing. 
Prerequisite: Graduate classification.

ECEN 750 Design and Analysis of Communication Networks  
Credits 3. 3 Lecture Hours.  
Analytical approach to understanding resource allocation on the Internet; study the system in a global sense, and use a deterministic approach to study congestion control protocols; study individual queues and routers, and use a stochastic approach to understanding system performance. 
Prerequisite: ECEN 646 or some probability background.

ECEN 751 Computational Methods for Integrated System Design  
Credits 3. 3 Lecture Hours.  
Integrated circuit design in a computational standpoint; VLSI circuit simulation, interconnect modeling and analysis, design and analysis of IC subsystems, parallel computing techniques for complex system design. 
Prerequisite(s): ECEN 454, ECEN 474 or equivalent.

ECEN 752 Advances in VLSI Circuit Design  
Credits 3. 3 Lecture Hours.  
Gate and wire delays, CMOS transistors, DC and AC characteristics, VLSI fabrication, Static, Dynamic, Pass-gate and PLA implementation styles, SOI and GaAs technology, DRAM, SRAM and FLASH memory design, leakage and dynamic power, sub-threshold computation, clocking, transmission lines, packaging, off-chip I/O, process variation and compensation, radiation tolerance. 
Prerequisite(s): Graduate classification or Instructor approval.

ECEN 753 Theory and Applications of Network Coding  
Credits 3. 3 Lecture Hours.  
Fundamentals of network coding: concepts, models, linear and non-linear codes, code design, random and deterministic codes; wireless network coding; network coding for storage; practical implementations; current research trends. 
Prerequisite: Graduate classification or approval of instructor.

ECEN 754 Optimization for Electrical and Computer Engineering Applications  
Credits 3. 3 Lecture Hours.  
Principles of optimization including linear and nonlinear optimization as well as electrical and computer engineering applications in signal estimation, routing in communication networks, flows in wireless networks, wafer fabrication plants, and economic dispatch in power systems. 
Prerequisites: MATH 304 or MATH 309 or MATH 311; MATH 251 or graduate classification.

ECEN 755 Stochastic Systems  
Credits 3. 3 Lecture Hours.  
Principles of stochastic systems including performance evaluation, estimation, control, scheduling, identification and adaptation, as well as electric and computer engineering applications; includes applications in communication networks and control. 
Prerequisites: MATH 411; approval of instructor and graduate classification.

ECEN 760 Introduction to Probabilistic Graphical Models  
Credits 3. 3 Lecture Hours.  
Broad overview of various probabilistic graphical models, including Bayesian networks, Markov networks, conditional random fields, and factor graphs; relevant inference and learning algorithms, as well as their application in various science and engineering problems will be introduced throughout the course. 
Prerequisites: Undergraduate level probability theory; basic programming skill in any programming language (C, C++, Python, Matlab, etc.).

ECEN 761 Biosensors Lab  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Biosensors Lab is a hands on experience in basic concepts of biosensing and how to make miniaturized biosensors; various application examples associated with these sensing principles. 
Prerequisite: Approval of instructor.

ECEN 762 Ultrasound Imaging  
Credits 3. 3 Lecture Hours.  
Covers mathematical analysis of wave propagation, scattering of ultrasound in biological tissues, electronic transducer arrays for the beam forming, models of the received signals and signal processing methods for medical ultrasound imaging of tissues. Research papers related to fundamental ultrasound imaging concepts are discussed throughout the course. 
Prerequisite: Approval of instructor.

ECEN 763/BMEN 627 Magnetic Resonance Engineering  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Design, construction and application of instrumentation for MR Imaging; fundamentals of the architecture if an MR spectrometer and the gradient subsystem used for image localization; emphasis on the radiofrequency sensors and systems used for signal generation and reception. 
Prerequisite(s): ECEN 410, or ECEN 411, BMEN 420, or equivalent, or approval of instructor. 
Cross Listing: BMEN 627/ECEN 763.
ECEN 764 Medical Imaging
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Physics and signals in medical imaging systems; focus on magnetic resonance imaging, x-ray computer tomography, ultrasonography, nuclear medicine imaging and optical imaging; includes system architecture, source generation, energy-tissue interaction, image formation and clinical examples.
Prerequisite: ECEN 314 or equivalent, or approval of instructor.

ECEN 770 Organic Semiconductor
Credits 3. 3 Lecture Hours.
Organic semiconductors are new semiconducting materials with huge application potentials; designed to help understand the material properties of organic semiconductors and the operation principles of organic electronic devices; gain broad knowledge in organic semiconductors, from the structure-property relationship to the design and optimization of organic devices and systems.
Prerequisite: Approval of instructor.

ECEN 771 Fluctuations and Noise Electronics
Credits 3. 3 Lecture Hours.
Introduction to the research of Noise and Fluctuations; Noise and Fluctuations in electronics and other systems include virtually all scientific fields, including secure and non-secure communications, microprocessors, quantum information, mesoscopic systems, chemical sensing, corrosion diagnostics, neuro- and membrane-biology, biomedicine, etc.
Prerequisite: Approval of instructor.

ECEN 772 Introduction to Microelectromechanical Devices and Systems
Credits 3. 3 Lecture Hours.
Provides a broad overview of the past and current developments in the emerging area of MEMS (microelectromechanical systems); discusses the fundamental working principles, designs and fabrication techniques; consists of several special topics, discussing the latest important applications in different fields.
Prerequisite: Consent of instructor.

ECEN 773 Introduction to Nanophotonics
Credits 3. 3 Lecture Hours.
(3-0). Photonic bandgap optical circuitry, photonic crystal fiber; visible to infrared semiconductor quantum lasers; semiconductor quantum dots; plasmonic field enhancement, plasmonic optical circuitry, sub-wavelength optical lithography, negative refractive index and sub-wavelength optical imaging; nano-structure characterization techniques, atomic force microscopy, near-field optical microscopy, scanning and transmission electron microscopy.
Prerequisite: Approval of Instructor.

ECMT 461 Economic Data Analysis
Credits 3. 3 Lecture Hours.
Concepts of statistical description, probability theory and statistical inference as they apply to economic analysis; data management, data handling and data analysis; focus on economic statistics with emphasis on regression analysis.
Prerequisite: MATH 141 or equivalent.

ECMT 463 Introduction to Econometrics
Credits 3. 3 Lecture Hours.
Application of mathematics and statistics to interpret economic phenomena; elementary econometric models and estimation techniques useful for estimating economic relationships and theories.
Prerequisites: ISYS 209; ECON 323; MATH 131 or MATH 142; STAT 211 or STAT 303.

ECMT - Econometrics

Courses
ECHE 244 School, Family and Community Dynamics in Early Childhood Education
Credits 3. 3 Lecture Hours.
Study of the family unit, home-school relationships; strategies for building cooperative activities with parents in the education of their children; healthy parent-school-community relationships; developing collaboration, communication, leadership and advocacy skills; increased sensitivity to cross-cultural issues and strategies for collaboration.

ECHE 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in early childhood education. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

ECHE 321 The Young Child and Early Childhood Education
Credits 3. 2 Lecture Hours. 6 Lab Hours.
Examines the world of the contemporary child, its demographics and diversity; explores the philosophical and historical foundation of early childhood education; examines early childhood programs and practices serving young children from birth through age nine; translates child development theory into developmentally appropriate practice.
Prerequisites: ECHE 244; junior classification.

ECHE 342 Strategies for Teaching Young Children
Credits 3. 2 Lecture Hours. 6 Lab Hours.
Application of sound principles of early childhood pedagogical best practices informed by research, child development and clinical literature; explores developmentally appropriate instructional strategies practiced at each age and grade level; examines effective learning environments, teacher-child interaction, cooperative grouping and inquiry strategies for teaching and learning.
Prerequisites: ECHE 244, ECHE 321; junior classification.

ECHE 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in early childhood education. May be repeated 2 times for credit.
Prerequisites: Junior or senior classification and approval of instructor.

ECHE-Early Childhd Ed Fld Based
ECMT 475 Economic Forecasting
Credits 3.3 Lecture Hours.
Econometric approach to prediction and forecasting; data mining and in-sample overfitting; exploratory data analysis; model selection; recursive techniques; structural change; nonlinear models; causality; forecast evaluation and combination; practical issues in real world prediction and forecasting.
Prerequisites: ECMT 463; junior or senior classification.

ECMT 660 Mathematical Economics I
Credits 3.3 Lecture Hours.
Use of selected types of mathematical tools in economic theory.

ECMT 669 Fundamental Mathematics for Economists
Credits 2.2 Lecture Hours.
Mathematics of nonlinear programming; applications to micro-theoretic models of demand and production; fundamental results from matrix theory and multivariate differential calculus; systems of differential equations and stability analysis and their economic applications.

ECMT 670 Econometric Analysis of Financial Data
Credits 3.3 Lecture Hours.
Predictability of asset returns, test of random walk hypothesis, the microstructure of securities markets, event analysis, the CAPM and arbitrage pricing theory, the term structure of interest rates, dynamic models of economic equilibrium and nonlinear financial models; provides an accessible combination of theory and practice.
Prerequisites: Graduate classification; must be enrolled in the department of economics master’s program; approval of director of master’s program.

ECMT 673 Economic Analytics
Credits 3.3 Lecture Hours.
Analysis of large household, corporate and financial data involving empirical modeling and SAS programming for prediction of economic decisions and outcomes; lecture, discussion and team project presentation format.
Prerequisites: Graduate classification and enrollment in the master’s program in economics.

ECMT 674 Economic Forecasting
Credits 3.3 Lecture Hours.
Empirical application of econometric techniques to prediction in economics; model building and specification; examination of various modern forecasting techniques.
Prerequisites: Graduate classification; must be enrolled in the MS program in the department of economics; or approval of instructor.

ECMT 675 Econometrics I
Credits 3.3 Lecture Hours.
Empirical distributions of economic variables; elementary discrete and continuous distributions expressing econometric hypotheses, distributions of estimators and test statistics.
Prerequisites: MATH 151 and MATH 152 or approval of instructor.

ECMT 676 Econometrics II
Credits 3.3 Lecture Hours.
Use of statistics in economic theory as device for testing hypotheses, formulation of concepts and economic forecasting; regression analysis in economics problems, heteroskedasticity, autocorrelation, distributed lags, regressions with lagged dependent variable, dummy variables and in introduction to multi-equations econometrics models.
Prerequisite: ECMT 675 or equivalent.

ECMT 677 Applied Microeconometrics
Credits 3.3 Lecture Hours.
Estimation methods applied to economic problems; techniques include single and simultaneous equations models; general linear model in matrix form; tests of linear restrictions; Wald, Likelihood Ratio and Lagrange Multiplier tests; seemingly unrelated regressions, simultaneous equations identification and estimation; missing observations, errors in variables and non-linear estimation in economics problems.
Prerequisites: ECMT 675 and ECMT 676; STAT 610 or approval of instructor.

ECMT 678 Nonparametric Econometrics
Credits 3.3 Lecture Hours.
Continuation of ECMT 677. Estimation methods applied to economic problems; techniques include qualitative limited dependent variables; pooled time-series and cross-section data; instrumental variables in economics problems. May repeated for credit.
Prerequisite: ECMT 677.

ECMT 679 Time Series Econometrics
Credits 3.3 Lecture Hours.
Advanced topics in time series econometrics, including ARMA models, unit roots and cointegration.
Prerequisite: ECMT 677.

ECMT 680 Financial Econometrics
Credits 3.3 Lecture Hours.
Basic concepts of financial engineering and elementary theory of stochastic processes and continuous time models; selected topics related to current financial econometrics research.

ECMT 682 Introduction to Economic Theory
Credits 3.3 Lecture Hours.
Use of selected types of mathematical tools in economic theory.

ECMT 683 Advanced Economic Theory
Credits 3.3 Lecture Hours.
Advanced topics in economic theory; the economic problem and the price system; theory of demand, theory of production and the firm, theory of supply; the interaction of demand and supply.

ECMT 684 Economic Policy Analysis
Credits 3.3 Lecture Hours.
Economic policy analysis; the effects of government deficits and debt, exchange rates and trade balances.
Prerequisite: ECON 202 or approval of undergraduate advisor.

ECMT 685 Special Topics in...
Credits 3.3 Lecture Hours.
Selected topics in an identified area of economics. May be repeated for credit.
Prerequisite: Approval of undergraduate advisor.
ECON 291 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the direction of faculty member in economics. May be taken three times for credit. 
**Prerequisites:** Freshman or sophomore classification.

ECON 311 Money and Banking
Credits 3. 3 Lecture Hours.
Fundamental principles of money, credit, and banking; arbitrage conditions in domestic and international capital markets; theoretical and institutional analysis of money markets.
**Prerequisite:** ECON 203.

ECON 312 Poverty, Inequality and Social Policy
Credits 3. 3 Lecture Hours.
Determinants of inequality in market earnings; philosophical and economic reasons for redistributing income; issues in measurement of inequality and poverty; examination of major social insurance and welfare programs and how they affect income distribution and performance of the economy.
**Prerequisite:** ECON 323 or concurrent enrollment.

ECON 315 Sports Economics
Credits 3. 3 Lecture Hours.
Application of economic concepts to the business and practice of sports; taxpayer funding of stadiums; applications of game theory to sports; impact of imperfect information; pricing strategies; testing models of discrimination in sports markets.
**Prerequisite:** ECON 202.

ECON 318/WGST 318 The Economics of Gender and Race
Credits 3. 3 Lecture Hours.
Theories and evidence on gender and race differences in labor market outcomes; labor supply and the role of family formation; the effect of human capital and discrimination on earnings; analysis of government policies; international comparisons.
**Prerequisites:** 6 hours drawn from the following: ECON 202, STAT 303, 3 hours in WGST above 200 level; junior or senior classification.
**Cross Listing:** WGST 318/ECON 318.

ECON 320 Economic Development of Europe
Credits 3. 3 Lecture Hours.
Development of wage system expansion of markets, Industrial Revolution, relation of industrial development to political policy.
**Prerequisites:** ECON 202 and ECON 203.

ECON 322 Applied Microeconomic Theory
Credits 3. 3 Lecture Hours.
Use of microeconomic theory in the analysis of problems that would face decision makers, not only in business but also in government, non-profit firms and other institutions.
**Prerequisite:** ECON 202. May not be counted toward a major in economics.

ECON 323 Microeconomic Theory
Credits 3. 3 Lecture Hours.
Determination of prices and their role in directing consumption, production, and distribution under both competitive and non-competitive market situations.
**Prerequisites:** ECON 202 and MATH 142.

ECON 324 Comparative Economic Systems
Credits 3. 3 Lecture Hours.
Foundations of the market economy, market socialism, and economic planning; comparative performance of these alternative institutional arrangements: economies in transition.
**Prerequisites:** ECON 202 and ECON 203.

ECON 328 Economics of Education
Credits 3. 3 Lecture Hours.
Application of economic analysis to education policy; theoretical basis for private and public investment in education; returns to education; the importance of school resources, school financing, school choice, and accountability.
**Prerequisites:** ECON 202; STAT 211, STAT 303 or equivalent.

ECON 330 Economic Development
Credits 3. 3 Lecture Hours.
A study of the less developed world: economic problems and solutions.
**Prerequisites:** ECON 202 and ECON 203.

ECON 410 Macroeconomic Theory
Credits 3. 3 Lecture Hours.
Theory of the determination of aggregate levels of national income, employment and prices; monetary and fiscal policy analysis, effects of government debt and deficits.
**Prerequisite:** ECON 203.

ECON 412 Public Finance
Credits 3. 3 Lecture Hours.
Economic role of governments; the choice of public sector output in a democracy and the effects of various taxes on resource allocation and income distribution.
**Prerequisite:** ECON 323.

ECON 414 Health Economics
Credits 3. 3 Lecture Hours.
Economics of health care in the U.S.; role of third party payers; supply and demand for health care; structure and consequences of public and private insurance; role of competition in health care markets among hospitals, insurance plans, physicians and pharmaceutical manufacturers; role of completion and regulation in medical innovation.
**Prerequisite:** ECON 323.

ECON 418 Economics of Labor
Credits 3. 3 Lecture Hours.
Economics of the labor market: factors affecting the economy’s demand for labor and the supply of labor; labor market problems such as unemployment and poverty; the economics of trade unions and collective bargaining.
**Prerequisite:** ECON 323.

ECON 420 Law and Economics
Credits 3. 3 Lecture Hours.
Mutual interaction of the prevailing legal system and economic phenomena; development of a series of testable hypotheses concerning the effects of laws and regulations on incentives and economic behavior, the allocation of resources and the distribution of income.
**Prerequisite:** ECON 323.

ECON 425 The Organization of Industry
Credits 3. 3 Lecture Hours.
Relationships between structure, conduct and performance of industries in the American economy using both theoretical and empirical material; antitrust regulation, pricing, product characteristics, advertising, technical change and environmental effects; the American experience contrasted with that of other countries; growth of international industries.
**Prerequisite:** ECON 323.
ECON 426 Economics of Antitrust and Regulation  
Credits 3. 3 Lecture Hours.  
Bureaucratic and judicial impact of antitrust laws and other regulatory means on the American economy; efficiency gains and losses associated with price discrimination, predation, cartelization, horizontal merger, vertical integration, resale price maintenance; Supreme Court opinions delivered in landmark antitrust cases.  
Prerequisite: ECON 323.

ECON 433 Energy Markets and Policy  
Credits 3. 3 Lecture Hours.  
Economics of energy markets and energy regulation with emphasis on implications for optimal energy policy; sectors include gasoline, oil, electricity, natural gas, renewables, nuclear; economic theory integrated with empirical applications from American and international experience; new energy markets, energy trading, and interaction with environmental policy.  
Prerequisites: ECON 323 and STAT 211/STAT 303 or approval of instructor; junior or senior classification.

ECON 435 Economics of Resource Scarcity  
Credits 3. 3 Lecture Hours.  
Natural resource management and use; problems of renewable and non-renewable resources including scarcity and market responses, role of property rights, externalities, benefit-cost analysis and energy policy.  
Prerequisite: ECON 323.

ECON 436 Environmental Economics  
Credits 3. 3 Lecture Hours.  
Economic theory and public policy as applied to environmental problems; role of market failure in explaining the existence of pollution; alternative strategies for pollution control and environmental management; global environmental issues.  
Prerequisites: ECON 323; Economic majors only.

ECON 440 Experimental Economics  
Credits 3. 3 Lecture Hours.  
Experimental techniques in economics and survey of literature in experimental economics; credibility of experimental data and criteria for determining reliability; application of statistical treatment to experimental data.  
Prerequisite: ECON 323.

ECON 445 Financial Economics  
Credits 3. 3 Lecture Hours.  
Economic analysis of money and financial markets; market structures, efficiency, institutional features; international markets; arbitrage; derivative securities; asset pricing in complete and incomplete markets; relation to rest of economy.  
Prerequisites: ECON 323; STAT 211 or STAT 303; junior or senior classification.

ECON 449 Economics of Decision-Making Strategy  
Credits 3. 3 Lecture Hours.  
Introduction to principles of decision-making and analysis of strategic interaction; formal modeling of decision problems involving one or more agents, integrating preferences, risk, and uncertainty into analysis, and using principles of game theory to advise choices; applications include search, signaling, design of contracts, agendas and repeated interaction.  
Prerequisites: ECON 323; junior or senior classification.

ECON 452 International Trade Theory and Policy  
Credits 3. 3 Lecture Hours.  
Basis for trade; theory of comparative advantage; determination of product and factor prices; gains from international trade; commercial policy and its implications for income distribution; concept of effective protection; market distortions, policy generated distortions and the arguments for tariffs.  
Prerequisite: ECON 323.

ECON 459 Games and Economic Behavior  
Credits 3. 3 Lecture Hours.  
Introduction to game theory for advanced undergraduates; definition and existence of an equilibrium point for strategic, repeated and extensive form games; strategic and evolutionary equilibrium refinements; equilibrium selection; applications include auctions, bargaining, oligopoly, strategic market games, team production, voting and behavioral game theory.  
Prerequisites: ECON 323; MATH 142 or equivalent or approval of instructor.

ECON 460 Introduction to Mathematical Economics  
Credits 3. 3 Lecture Hours.  
Introduction to mathematical economics; application of mathematical tools in economic theory; fundamental results from differential and integral calculus; duality theory in consumer and producer theory; classical optimization techniques, elementary differential equations and stability analysis.  
Prerequisites: ECON 323 and ECON 410; MATH 131 or MATH 142; junior or senior classification.

ECON 465 Contemporary Economic Issues  
Credits 3. 3 Lecture Hours.  
Application of microeconomic and macroeconomic analyses to evaluate contemporary economic issues.  
Prerequisites: ECON 323 and ECON 410.

ECON 470 Program Evaluation  
Credits 3. 3 Lecture Hours. 1 Lab Hour.  
Economic approaches to program policy evaluation; empirical microeconomic tools; natural experiments; design experimental and quasi-experimental method.  
Prerequisite: ECON 323 or approval of instructor.

ECON 484 Internship  
Credits 0 to 3. 0 to 3 Other Hours.  
Directed internship in an organization to provide on-the-job training and applied research experience with professionals in settings appropriate to economics and student professional interest. Maximum 3 hours can count toward major. Must be taken on a satisfactory/unsatisfactory basis.  
Prerequisites: Major in economics; 12 completed hours of economics including ECON 323; 2.5 cumulative GPA; 2.5 GPA in economic courses; pre-approval of the director of economics internship programs.

ECON 485 Directed Studies  
Credits 0 to 6. 0 to 6 Other Hours.  
Research and design of specific problem areas approved on an individual basis with the intention of promoting independent study and to supplement existing course offerings. Results of study presented in writing.  
Prerequisites: Major or minor in economics; approval of undergraduate advisor.

ECON 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of economics. May be repeated for credit.  
Prerequisite: Approval of undergraduate advisor.
ECON 491 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in economics.
May be taken three times for credit.
Prerequisites: Junior or senior classification; ECON 323; ECON 410; ECMT 463.

ECON 603 Public Economics I
Credits 3. 3 Lecture Hours.
Economics of taxation and public spending; theoretical and empirical analysis of the shifting and incidence of income, commodity and property taxes; models of optimal taxation and public spending; analysis of taxation and spending in a federal system of government.
Prerequisite: Approval of instructor.

ECON 604 Public Economics II
Credits 3. 3 Lecture Hours.
Economics of collective action; theoretical and empirical analysis of externalities; externalities and public policy; the demand and supply of public goods; economic analysis of alternative systems of public choice; models of bureaucratic behavior.
Prerequisite: ECON 629 or approval of instructor.

ECON 607 Foundations of Microeconomic Theory
Credits 3. 3 Lecture Hours.
Examination of positive and normative analysis in economic theory; emphasis on policy applications of the theory.
Prerequisites: MATH 131 or equivalent; ECON 323 or equivalent; or approval of instructor.

ECON 609 Human Resource Economics I
Credits 3. 3 Lecture Hours.
Valuation and allocation of human resources; labor supply of households, labor supply over the life-cycle, determination of wages, human capital, migration, education, labor markets and population; use of the testable implications of theory and of evidence to explain observed labor market behavior.
Prerequisite: ECON 629 or equivalent.

ECON 610 Human Resource Economics II
Credits 3. 3 Lecture Hours.
Selected topics in labor markets; unemployment, earnings differentials, effects of occupational licensing, trade unions, income distribution, military manpower and the draft, effects of minimum wage and equal pay provisions, effects of welfare programs, the professional athlete's labor market and others; developing and analyzing empirical problems.
Prerequisite: ECON 629 or equivalent.

ECON 611 Foundations of Macroeconomic Theory
Credits 3. 3 Lecture Hours.
Development of modern static national income analysis from general equilibrium system; roles of fiscal and monetary policy in promoting economic stability.
Prerequisites: ECON 323 and ECON 410; MATH 131 or equivalent.

ECON 612 Money, Banking and Financial Markets
Credits 3. 3 Lecture Hours.
Role of financial markets and institutions in the allocation of resources in the real economy; the financial regulatory and policy infrastructure underlying financial activity to promote efficiency in asset valuation, risk management and economic growth.
Prerequisite: Graduate classification; enrolled in the department of economics master's program or approval of director of master's program.

ECON 614 Economics of Microfinance
Credits 3. 3 Lecture Hours.
Analysis of recent research in financial markets in developing countries with a primary emphasis on microfinance; micro-asymmetries involved in lending; financial impact studies; the macro-economic literature on financial development and growth.
Prerequisites: ECON 607 or equivalent; graduate major in the Department of Economics' master's program or approval of director of master's program.

ECON 617 Economics of the Multinational Firm
Credits 3. 3 Lecture Hours.
Economics of the multinational firm, taking a firm-level approach to the study of international investment; structured around recent papers from the frontier of international trade research; examination of trends in multinational activity and exploration of the reasons behind decisions to invest abroad including understanding different types of foreign direct investment; the impact of multinational firms and how government policies impact foreign direct investment (FDI), including an overview of transfer pricing and the arm's length principle.
Prerequisites: Graduate classification; enrolled in the department of economics master's program.

ECON 618 Behavioral Financial Economics
Credits 3. 3 Lecture Hours.
Describes how individuals and firms make financial decisions that deviate from those predicted by traditional financial or economic theory; examines how the insights of behavioral finance complement the traditional finance paradigm.
Prerequisites: Graduate classification; must be enrolled in the master's program in the department of Economics.

ECON 629 Microeconomic Theory I
Credits 3. 3 Lecture Hours.
Core ideas in theoretical microeconomics; theory of consumer and firm; theory of competitive output and factor markets.
Prerequisite: Approval of instructor.

ECON 630 Microeconomic Theory II
Credits 4. 4 Lecture Hours.
Advanced treatment of consumer and production theory; game theory; general equilibrium and welfare analysis.
Prerequisites: ECON 629; ECMT 660.

ECON 631 Microeconomic Theory III
Credits 3. 3 Lecture Hours.
Advanced theoretical microeconomics; comprehensive study of consumer and producer theory, general equilibrium and welfare, and failures of the competitive model.
Prerequisites: ECON 629 and ECON 630.

ECON 632 Microeconomic Theory IV
Credits 3. 3 Lecture Hours.
Advanced topics in game theory; repeated games and reputation, strategic information transmission; learning and evolution; models of bargaining and networks.
Prerequisites: Graduate classification; ECON 629 and ECON 630 or approval of instructor.
ECON 633 Energy Markets and Policy
Credits 3.3 Lecture Hours.
Economics of energy markets and energy regulation with emphasis on implications for optimal energy policy; sectors include gasoline, oil, electricity, natural gas, renewables, nuclear; economic theory integrated with empirical applications from American and international experience; new energy markets, energy trading, and interaction with environmental policy.
Prerequisite: Graduate classification.

ECON 635 Monetary Theory
Credits 3.3 Lecture Hours.
Traditional and modern theories of money; general equilibrium systems and role of money in determination of prices, interest rate, income and employment.
Prerequisite: ECON 636.

ECON 636 Macroeconomic Theory I
Credits 3.3 Lecture Hours.
Theory of consumption, investment, money, interest, inflation and employment.
Prerequisite: ECON 410 or ECON 611.

ECON 637 Monetary Policy
Credits 3.3 Lecture Hours.
Effect of monetary policy on aggregate economic activity and distribution of resources; effectiveness of various policies; optimal policy in light of various institutional restrictions that exist.
Prerequisite: ECON 635.

ECON 646 Macroeconomic Theory II
Credits 3.3 Lecture Hours.
Dynamic models, open economies, disequilibrium analysis, unemployment and inflation; traditional macro models and recent developments in macro theory.
Prerequisite: ECON 636.

ECON 649 Industrial Organization I
Credits 3.3 Lecture Hours.
Industry structure, conduct and performance described and analyzed with tools of microeconomics.
Prerequisite: Approval of instructor.

ECON 650 Industrial Organization II
Credits 3.3 Lecture Hours.
Behavior of markets operating under conditions of imperfect information; construction and scientific evaluation of models designed to explain industry performance.
Prerequisite: ECON 649 or approval of instructor.

ECON 652 International Trade Theory
Credits 3.3 Lecture Hours.
Classical and neoclassical models of international trade. International price formation, patterns of trade and gains from exchange; specialization and comparative advantage; factor proportions, factor prices and the Heckscher-Ohlin theorem; foreign trade and growth; tariffs, customs unions and commercial policy.
Prerequisite: ECON 630 or approval of instructor.

ECON 655 Experimental Economics
Credits 3.3 Lecture Hours.
Experimental methods in choice behavior experiments, survey research, planned economic environments and animal experiments.
Prerequisite: Approval of instructor.

ECON 659 Behavioral Game Theory
Credits 3.3 Lecture Hours.
Static and dynamic games of complete and incomplete information and other advanced topics in game theory.

ECON 668 Decisions Under Risk and Uncertainty
Credits 3.3 Lecture Hours.
The mean-variance and expected utility decision models; the use of risk models in asset valuation, financial decision-making and economic analysis; portfolio choice, insurance demand, saving, investment and consumption decisions.
Prerequisites: ECON 607 or equivalent; enrolled in the Department of Economics' master's program or approval of director of the master's program.

ECON 675 Capstone for Financial Economics/Financial Econometrics
Credits 3.3 Lecture Hours.
Integration of the knowledge gathered in coursework including micro- and macro-economics, financial economics, econometrics, forecasting, and other analytical tools; production of major group research paper utilizing professional literature, both printed and electronic, and published data.
Prerequisites: Graduate classification; 2 year master's student enrolled in the master's program in the department of economics.

ECON 680 Financial Economics
Credits 3.3 Lecture Hours.
Advanced theory of dynamic asset pricing utilizing the Economics of risk and uncertainty within a general equilibrium framework; stochastic calculus applications to the analysis of asset markets; theoretical foundations and empirical testing.
Prerequisites: ECON 630 and ECON 646.

ECON 684 Professional Internship
Credits 1 to 6.1 to 6 Other Hours.
Opportunities to put economics learned in the classroom into practice at government or industry facilities; design projects supervised by faculty coordinators and personnel at these locations; projects selected to match student's area of specialization.
Prerequisites: Graduate classification and enrolled in the master's program in the department of economics.

ECON 685 Directed Studies
Credits 1 to 6.1 to 6 Other Hours.
Directed individual instruction in selected problems in economics not related to thesis or dissertation.
Prerequisites: Graduate major or minor in economics; approval of instructor.

ECON 689 Special Topics in...
Credits 1 to 4.1 to 4 Lecture Hours.
Selected topics in an identified area of economics. May be repeated for credit.
Prerequisite: Approval of department head.

ECON 690 Theory of Economic Research
Credits 3.3 Lecture Hours.
Design of research experiments in various subfields of economics, and evaluation of research results with the aid of examples taken from the current scientific literature.

ECON 691 Research
Credits 1 to 23.1 to 23 Other Hours.
Thesis research.

EDCI - Educ Curriculum & Dev
**Courses**

**EDCI 285 Directed Studies**  
**Credits 1 to 4. 1 to 4 Other Hours.**  
Research problems and readings in areas selected to supplement existing offerings; individual reports, oral and written, required.  
**Prerequisites:** Freshman or sophomore classification; approval of instructor.

**EDCI 289 Special Topics in...**  
**Credits 1 to 4. 1 to 4 Lecture Hours.**  
Selected topics in an identified area of educational curriculum and instruction. May be repeated for credit.  
**Prerequisite:** Approval of department head.

**EDCI 353 Early Childhood through Adolescent Education**  
**Credits 3. 3 Lecture Hours.**  
Early childhood through adolescent approaches and instructional materials appropriate for EC through middle school programs; impact of research and theory on child development from gestation to early adolescence on instructional practices.  
**Prerequisites:** Admission to teacher education.

**EDCI 354 Early Childhood and Adolescent Curriculum and Lesson Design**  
**Credits 3. 3 Lecture Hours.**  
Examination of curriculum models used in educational environments designed for young children through adolescents and the organization of the curriculum; investigation of state-adopted curriculum knowledge and skills standards and materials as well as their use and expansion.  
**Prerequisites:** EDCI 364 and EDCI 353; concurrent enrollment in TEFB 371.

**EDCI 364 Creativity and the Young Child**  
**Credits 3. 3 Lecture Hours.**  
Creative expression in young children with a focus on artistic and musical expression, creative movement and creative dramatics; creativity as related to development of the right hemisphere of the brain.  
**Prerequisites:** EPSY 320; concurrent enrollment in EDCI 453.

**EDCI 365 Using Technology Classrooms**  
**Credits 3. 3 Lecture Hours.**  
Overview of technology as it relates to the design of instruction and practices that support effective teaching and learning; how learning theories are reflected in and supported by technology; current and emerging applications in technology delivered and supported learning environments.  
**Prerequisite:** Junior or senior classification.

**EDCI 455 Home-School Involvement in Early Childhood Education**  
**Credits 3. 3 Lecture Hours.**  
The family unit, home-school relationships and strategies for building cooperative activities with parents in the education of their children; experience with the development of parent involvement materials.  
**Prerequisites:** EDCI 364 and EDCI 453; admission to teacher education.

**EDCI 485 Directed Studies**  
**Credits 0 to 4. 0 to 4 Other Hours.**  
Research problems and readings in areas selected to supplement existing offerings; individual reports, oral and written, required.  
**Prerequisites:** Junior or senior classification; approval of instructor.

**EDCI 489 Special Topics in...**  
**Credits 0 to 4. 0 to 4 Lecture Hours.**  
Study of selected topics in an identified area of curriculum and instruction. May be repeated for credit.  
**Prerequisite:** Approval of department head.

**EDCI 601 Disciplinary Knowledge and Research in Curriculum and Instruction**  
**Credits 3. 3 Lecture Hours.**  
Emphasizes key research and researchers, discipline-specific information, and the initial identification of researchable questions in the field of curriculum and instruction.  
**Prerequisite:** PhD classification in TLAC.

**EDCI 602 Cultural Foundations of Education**  
**Credits 3. 3 Lecture Hours.**  
Contributions of behavioral sciences applied as analytic tools in solving problems of curriculum and instruction.

**EDCI 603 Professional Development: Strategies for Teachers**  
**Credits 3. 3 Lecture Hours.**  
Principles of organizational management, instructional design, and change theory in framing professional development programs.  
**Prerequisite:** Graduate classification.

**EDCI 604 E-Learning Classroom Management**  
**Credits 3. 3 Lecture Hours.**  
Focuses on the development of effective management skills crucial to successful instruction and student achievement; application of theory and research to practice and establish oneself as a professional in the area of classroom management; applicable to elementary, middle level, and secondary school settings.  
**Prerequisite:** Graduate classification.

**EDCI 605 Qualitative Research Methods in Curriculum and Instruction**  
**Credits 3. 3 Lecture Hours.**  
Theoretical and methodological issues related to qualitative inquiry; discussion of qualitative paradigm’s ontological, epistemological, and axiological stances; review and implementation of commonly used qualitative research methods and approaches in curriculum and instruction, including narrative, phenomenology, ethnography, grounded theory, and case study approaches.  
**Prerequisite:** Graduate classification.

**EDCI 606 Cognition, Culture and Literacies**  
**Credits 3. 3 Lecture Hours.**  
Exploration of complex interrelationships among cognition, culture, and literacies and their implications for education.  
**Prerequisite:** Graduate classification.

**EDCI 609 Analysis and Reporting for Records of Study**  
**Credits 3. 3 Lecture Hours.**  
Analysis of field-generated and existing data, classroom observations, empirical tests, and discussions; links theoretical and practical educational theory to analyses of qualitative and quantitative data; teacher-leaders interpretation of classroom phenomena using research-based theories for teaching and learning.  
**Prerequisites:** Graduate classification; EPSY 635 or equivalent.

**EDCI 610 Second Language Assessment and Development**  
**Credits 3. 3 Lecture Hours.**  
Second language assessment and development stressing classroom situations to teach second language acquisition.  
**Prerequisite:** Graduate classification.

**EDCI 611 Teaching English as a Second Language**  
**Credits 3. 3 Lecture Hours.**  
Translation of theory into practice stressing various methods and techniques in ESL; relationship of language development, culture and conceptual processes to language teaching.  
**Prerequisite:** Graduate classification.
EDCI 612 Bilingual/ESL Content-Area Instruction  
Credits 3.3 Lecture Hours.  
Integrating English language instruction with content-based ESL instruction in science, mathematics and social sciences for non-English speaking students.  
Prerequisite: Graduate classification.

EDCI 614 ESL for International and Intercultural Settings  
Credits 3.3 Lecture Hours.  
International and intercultural teaching practices with major emphasis on second language instruction in an international setting.  
Prerequisite: Graduate classification.

EDCI 615 Classroom Practice in Adult ESL  
Credits 3.3 Lecture Hours.  
Literacy practice issues in adult ESL literacy leading to assessment, instructional planning, curriculum development and program evaluation.  
Prerequisite: Graduate classification.

EDCI 617 Early Childhood Mathematics and Science  
Credits 3.3 Lecture Hours.  
Development of mathematical and science concepts in young children from developmental and scientific perspectives.  
Prerequisite: Graduate classification.

EDCI 619 Teaching and Learning Number and Quantity Concepts  
Credits 3.3 Lecture Hours.  
Examination of the content, pedagogy, technology, and research on teaching and learning concepts on number and quantity concepts; discussion of contemporary issues in K-12, standards and assessment.

EDCI 620 Science, Technology, Engineering and Mathematics (STEM) Teaching and Learning  
Credits 3.3 Lecture Hours.  
Examination of integrated and multidisciplinary practice-based pedagogies; building of interdisciplinary bridges among content areas; melding sociocultural and cognitive factors influencing STEM education across K-12 levels; discussion of underrepresented groups binding best practices; development and evaluation of STEM project-based learning.  
Prerequisite: Graduate classification.

EDCI 621 Teaching and Learning Space, Dimension, and Measurement Concepts  
Credits 3.3 Lecture Hours.  
Examination of the content, pedagogy, technology, and research on teaching and student learning concepts on space, dimension, and measurement concepts. Discussion of contemporary issues in K-12, standards and assessments.

EDCI 622 Theories of Learning and Teaching Mathematics  
Credits 3.3 Lecture Hours.  
Theoretical bases of the learning and teaching of mathematics, including an examination of the research which supports the theoretical bases.

EDCI 623 Teaching and Learning Pattern and Change Concepts  
Credits 3.3 Lecture Hours.  
Examination of the content, pedagogy, technology, and research on teaching and learning concepts on skills in algebra, functions and calculus. Discussion of contemporary issues in K-12, standards and assessment.

EDCI 624 Assessing Cognitive, Conceptual, and Fluency Structures Related to Learning and Teaching Mathematics  
Credits 3.3 Lecture Hours.  
Examines diagnostic and assessment procedures in mathematics and their potential for identifying problem areas related to children’s acquisition of mathematical skills; number and quantity concepts.  
Prerequisite: Graduate classification.

EDCI 625 Teaching and Learning Mathematics with Diverse Learners  
Credits 3.3 Lecture Hours.  
Examining diagnostic and assessment procedures in mathematics and their potential for identifying problem areas related to children's acquisition of mathematical skills; number and quantity concepts.  
Prerequisite: EDCI 624.

EDCI 627 Teaching and Learning Data Analysis and Uncertainty Concepts  
Credits 3.3 Lecture Hours.  
Examination of the content, pedagogy, technology, and research on teaching and student learning of concepts and skills in probability, statistics, and discrete mathematics; discussion of contemporary issues and K-12 curriculum, standards and assessment.  
Prerequisite: Graduate classification.

EDCI 628 Analyzing and Reporting Field Based Research  
Credits 3.3 Lecture Hours.  
Analyze data from classroom observation, empirical tests and interviews; link theoretical and practical mathematics education to analysis of qualitative and quantitative data; equip teacher-leaders and researchers with the resources to interpret classroom phenomena from the research perspective using research-based theories of teaching and learning.  
Prerequisite: Graduate classification.

EDCI 629 Benchmarks in Urban Education  
Credits 3.3 Lecture Hours.  
Identifies, analyzes, and applies benchmarks in urban education using research findings.  
Prerequisites: Doctoral classification; urban education emphasis or approval of instructor; concurrent enrollment in EDCI 637.

EDCI 630 Urban Education  
Credits 3.3 Lecture Hours.  
Develops a knowledge base in urban education; share and discuss theoretical and conceptual frameworks that permeate city schools; examines historical perspective, pedagogical knowledge and insights of urban educational experiences.  
Prerequisites: Graduate classification; urban education emphasis; concurrent enrollment in EDCI 648; or approval of instructor.

EDCI 631 Mentoring the Novice Educator  
Credits 3.3 Lecture Hours.  
To prepare the “teaching” graduate student to observe, evaluate, and reflect upon teaching, mentoring, communication, and supervision skills that support the novice or pre-service teacher with tools necessary to be successful. Examine research related to effective mentoring and supervising strategies and behaviors in environments which support mentoring behavior.  
Prerequisite: Graduate classification.

EDCI 632 Program Evaluation in Curriculum and Instruction  
Credits 3.3 Lecture Hours.  
Program evaluation, investigating its purposes and procedures, with attention to settings, personnel and performance; review of standards, principal theories and models; study of histories, political contexts, ethics and the nature of evidence.  
Prerequisite: Graduate classification.
EDCI 633 Educator as Learner  
**Credits 3. 3 Lecture Hours.**
Designed to challenge the graduate learner as one who studies metacognition, working to understand how self and others process learning, maximize application of learning and evaluate the meaning of learning; for students working with others in a role of mentor, supervisor, administrator or coach in a PK-12 setting.  
**Prerequisite:** EDCI 631.

EDCI 634 Reflective Inquiry  
**Credits 3. 3 Lecture Hours.**
Explores the differences and unique characteristics of moral, multiperspective, collaborative, deliberative, autobiographical, and critical inquiries, and reflective practice related to all forms of inquiry; analyzes the implications of educator growth through reflective practices and the part that reflection plays in developmental growth and professional development.  
**Prerequisite:** Graduate classification.

EDCI 636 Educator as Researcher  
**Credits 3. 3 Lecture Hours.**
Develops action research skills to enable them to critically analyze insights into the historical, philosophical and social foundations of reflective teaching and leadership in educational environments. Includes an analysis of theories, methodologies, implications and actions related to educational action research.  
**Prerequisite:** Graduate classification.

EDCI 637 Urban Education: Policy and Analysis  
**Credits 3. 3 Lecture Hours.**
Urban education policy making processes, emphasis on interaction between politics and educational policy.  
**Prerequisites:** Doctoral classification; emphasis in urban education or approval of instructor; concurrent enrollment in EDCI 629.

EDCI 638 Trends in Curriculum and Instruction  
**Credits 3. 3 Lecture Hours.**
Recent research and development in theories and practices of curriculum and instruction; curriculum innovations, school organization and new instructional media.

EDCI 639 Grant Writing for Professional Development  
**Credits 3. 3 Lecture Hours.**
Focus on the skills necessary to address a Request for Proposal (RFP) through the development and writing of a competitive funding proposal; attention to the process of identifying foundation, public, and corporate funding opportunities available to support specific programmatic needs/areas.  
**Prerequisite:** Graduate classification.

EDCI 640 Language/Literacy for Bilingual/Multicultural Young Learners  
**Credits 3. 3 Lecture Hours.**
Critical multicultural perspectives on the acquisition and development of communication skills by young children who represent bilingual and multicultural backgrounds; critique of language development practices as applied in education settings with young children.  
**Prerequisite:** Graduate classification.

EDCI 641 The African American Learner in Urban Settings  
**Credits 3. 3 Lecture Hours.**
Supports graduate level students in locating, reviewing, synthesizing, and analyzing research on the African American learner in urban settings.  
**Prerequisites:** Doctoral classification; urban education emphasis; or approval of instructor.

EDCI 642 Multicultural Education: Theory, Research and Practice  
**Credits 3. 3 Lecture Hours.**
Theory and research that undergirds the discipline of multicultural education by exploring the philosophical, anthropological and psychological theoretical frameworks.  
**Prerequisite:** Graduate classification.

EDCI 643 Teaching in Urban Environments  
**Credits 3. 3 Lecture Hours.**
Provide educators with historical perspectives, pedagogical knowledge and insights concerning educational experience of teachers and learners in urban environments. Will address cognitive, psychomotor and affective aspects of teaching and learning in urban environments.  
**Prerequisite:** Graduate classification.

EDCI 644 Curriculum Development  
**Credits 3. 3 Lecture Hours.**
Curriculum development; bases of curriculum design; problems of balance, scope, organization, sequence, selection and articulation.

EDCI 645 Society and Education in World Perspective  
**Credits 3. 3 Lecture Hours.**
Comparative education; interrelationships among societal institutions and particular roles that education plays in different cultures and political systems.

EDCI 646 Instruction Theory  
**Credits 3. 3 Lecture Hours.**
Theoretical basis for research and training in instruction; systematic study of existing research on key factors influencing instructional effectiveness. Exploration of interaction among variables of instruction. Doctoral level only.

EDCI 647 Curriculum Theory  
**Credits 3. 3 Lecture Hours.**
Theoretical basis for curriculum conceptualization, development, evaluation and implementation; value and empirical basis of curriculum decision-making strategies for curriculum change. Doctoral level only.

EDCI 648 Urban Schools and Communities  
**Credits 3. 3 Lecture Hours.**
Sociological, historical, philosophical, anthropological, and political dimensions of urban schools and community change; issues and contexts grounded in core disciplines of social sciences.  
**Prerequisites:** Graduate classification.

EDCI 650 The Bilingual/Multicultural Young Child in Family and Culture  
**Credits 3. 3 Lecture Hours.**
Bilingual/multicultural notions of family/culture as foundations for learning/anthropological investigation including cross-cultural comparisons of western concepts of "child" and "parenting;" critique of various constructions of child as learner within family context and monocultural perspectives of "developmentally appropriate" educational practice.  
**Prerequisite:** Graduate classification.

EDCI 651 Bilingual/Multicultural Early Childhood Education  
**Credits 3. 3 Lecture Hours.**
Historical/current models of early childhood curriculum/methodology as a foundation for the more critical analysis of curriculum as social construction, grounded within values of a particular society or culture; bilingual/multicultural views of early childhood education, curriculum and teaching strategies requiring constant examination.  
**Prerequisite:** Graduate classification.
EDCI 652 Parental Involvement in Early Childhood Education
Credits 3. 3 Lecture Hours.
Dynamics of the family unit, school-home communication systems, legalities of parent participation in the school, parent involvement, parent training and home bound programs; development of programs with parents.

EDCI 653 Education Policy for Language-Minority Children
Credits 3. 3 Lecture Hours.
Analysis of language planning, educational policies and instructional models in the U.S. and internationally for the education of young language-minority students.
Prerequisite: Graduate classification.

EDCI 654 Organization and Operation of Early Childhood Education Programs
Credits 3. 3 Lecture Hours.
Comprehensive survey of the various types of preschool centers serving the needs of young children; operating procedures, programs and services provided; experimental educational research projects now being conducted with young children.

EDCI 655 Contemporary Visual Culture
Credits 3. 3 Lecture Hours.
Interdisciplinary investigation of visual culture and related cultural, social, political, digital, ontological, and educational issues, theories, and production and consumption practices in the postmodern era; examination of contemporary visual culture as a site of critical inquiry that promotes social justice, cultural work, and democratic pedagogy.
Prerequisite: Graduate classification.

EDCI 656 Learning Theories for Teachers of Young Children
Credits 3. 3 Lecture Hours.
Educational applications developed from theory and research of young learners, specifically the processes of learning.
Prerequisite: Graduate classification.

EDCI 657 History of Education
Credits 3. 3 Lecture Hours.
The genesis of formal education in the Western world beginning with the ancient Greeks and working through the Enlightenment; tracing the idea that schooling is a fundamental part of human existence and therefore crucial to all questions concerning the human condition.
Prerequisite: Doctoral classification or approval of instructor.

EDCI 658 History of American Education
Credits 3. 3 Lecture Hours.
The social and institutional role of public education in the United States from 1789 to the present; including clarification of the political and economic underpinnings that have worked catalytically to change the structure of public education in terms of philosophy, methods and curricula.
Prerequisite: Doctoral classification or approval of instructor.

EDCI 660 Research Investigating the Science Teacher Professional Continuum in Texas
Credits 3. 3 Lecture Hours.
Reviews general features and investigates aspects of the science teacher professional continuum (TPC), including recruitment, retention, induction, mentoring, professional development, professional culture, and reformed practice; uses extant data sets in TPC research, including literature review, conceptual framework development, research proposal, IRB approval, data analysis, and making conclusions.
Prerequisite: Graduate classification in EDCI or approval of instructor.

EDCI 661 Mixed Methods Research in Curriculum and Instruction
Credits 3. 3 Lecture Hours.
Introduction to mixed methods research, including a brief history of approaches to educational research; comparison of scientific research and educational research; specific designs and methods for mixing qualitative and quantitative approaches in data collection, analysis, and synthesis.
Prerequisite: Graduate classification.

EDCI 662 Philosophical Theories of Education
Credits 3. 3 Lecture Hours.
Selected historical theories of education from Plato to Skinner; evaluating educational ends and means; the nature of knowledge, its acquisition and transmission. Doctoral level only.

EDCI 663 Scientific Inquiry in K-16 Classrooms
Credits 3. 3 Lecture Hours.
Theory and research on the integration of scientific inquiry into classroom instruction in K-16 learning environments, emphasizing curriculum decision-making, alignment, and design across the K-16 continuum.

EDCI 665 Science and Mathematics Curricula
Credits 3. 3 Lecture Hours.
Critical exploration of the trends and issues in school science and mathematics programs; consideration of the foundations and strategies for the design, selection, and evaluation of mathematics and science curricula.

EDCI 666 History and Culture of Science Education: 1900 to Present
Credits 3. 3 Lecture Hours.
Analysis of research in science education which relates the historical and philosophical basis of science and science teaching; emphasis on implications for improved instruction, especially on the nature of science, its relation to other disciplines, and student understanding of the scientific way of knowing.

EDCI 667 Research and Foundations of Science Education
Credits 3. 3 Lecture Hours.
Introduction to mixed methods research, including a brief history of approaches to educational research; comparison of scientific research and educational research; specific designs and methods for mixing qualitative and quantitative approaches in data collection, analysis, and synthesis.
Prerequisite: Graduate classification.

EDCI 668 History and Culture of Science Education: 1900 to Present
Credits 3. 3 Lecture Hours.
Science education as a discipline, profession, culture and a component in the education of K-16 students during the last 100 plus years in the United States and selected developed nations.
Prerequisite: Graduate classification.

EDCI 669 Science Education in Sociological Context
Credits 3. 3 Lecture Hours.
Explores science and its endeavors from a sociological perspective in order to make inferences on school science practice and science teaching; discusses the social context of disciplinary knowledge, problems of experimentation and scientific measurement, originality, cognitive particularism, collectivistization of science, and peer review.
Prerequisite: Graduate classification.

EDCI 670 Social Studies in Elementary and Secondary Education
Credits 3. 3 Lecture Hours.
Methodology course focusing upon the implementation, both practical and theoretical, of the objectives of social studies: current trends, resource materials, demonstrations of teaching methods.

EDCI 671 How People Learn Science
Credits 3. 3 Lecture Hours.
The study of science learning and epistemology, centered upon the essays "How People Learn and How Students Learn Science;" reviewing and discussing learning science design strategies and theories of learning science in light of understanding and advancing students’ learning, classroom interactions, and the organization of schools.
Prerequisite(s): Graduate classification.
EDCI 673 Analysis of Teaching Behavior
Credits 3.3 Lecture Hours.
Identification of beliefs and assumptions regarding teaching; review of research on teacher effectiveness; alternative methods for gathering data regarding dimensions of teaching behavior; development of teacher analysis systems.

EDCI 675 Teaching Strategies: Patterns of Learning
Credits 3.3 Lecture Hours.
Learning and teaching theory and research applied to development of teaching strategies appropriate for various contents, objectives and instructional situations; variables influencing learner behavior and approaches to optimization of teacher behavior.
Prerequisite: EPSY 602 or EPSY 673 recommended.

EDCI 676 Evaluation and Implementation of Electronic Learning Materials
Credits 3.3 Lecture Hours.
Principles of instructional design applied to electronic materials adoption and organizational management for implementation of eLearning resources; Emphasis on guidelines for selecting and evaluating eLearning resources addressing individual learner needs using online delivery platforms.
Prerequisite: Graduate classification.

EDCI 677 Strategies for Teaching in a Culturally Pluralistic Society
Credits 3.3 Lecture Hours.
Research concerning the cognitive, psychomotor and affective aspects of learning and teaching among culturally diverse learners; practical applications to curriculum and instruction.

EDCI 680 Proseminar
Credit 1.1 Other Hour.
Structured seminar on major concepts, principles and issues in education drawn and analyzed from various contributing theoretical and research bases. Critical new developments incorporated as they occur. Required of all Ed.D. students. May be repeated for credit.
Prerequisite: Approval of instructor.

EDCI 681 Seminar
Credit 1.1 Lecture Hour.
Professional roles and responsibilities, research, special topics and other issues relevant to master's and doctoral students in curriculum and instruction.

EDCI 682 Seminar in...
Credit 1.1 Lecture Hour.
Knowledge, skills and attitudes in educational curriculum and instruction. Specific topics will be assigned for each seminar as it is offered. May be repeated for credit.

EDCI 683 Field Practicum
Credits 1 to 3.1 to 3 Other Hours.
Designed to provide supervised experiences based upon a theoretical framework in profession settings related to the work of teaching, learning and culture; practical experiences closely supervised by the department faculty.
Prerequisite: Approval of instructor.

EDCI 684 Professional Internship
Credits 1 to 6.1 to 6 Other Hours.
On-the-job training for educational curriculum and instruction majors under the supervision of successful, experienced personnel from the University; conducted in a setting appropriate to the student's projected career aspirations and areas of specialization.

EDCI 685 Directed Studies
Credits 1 to 4.1 to 4 Other Hours.
Directed individual study of selected problems in the field of education.

EDCI 686 Research Methods in EDCI I
Credits 3.3 Lecture Hours.
Framework for understanding distinctions among research methodologies used in the field of curriculum and instruction; includes classes of research questions, methods of collecting and decisioning evidence, theoretical assumptions, strengths, weaknesses, and the work of major proponents.
Prerequisite: Admission into TLAC doctoral program.

EDCI 687 Research Methods in EDCI II
Credits 3.3 Lecture Hours.
Framework for understanding distinctions among research methodologies used in the field of curriculum and instruction; includes classes of research questions, methods of collecting and decisioning evidence; basic principles of descriptive and inferential statistics and their application in context of various research paradigms.
Prerequisite: EDCI 686.

EDCI 688 Research Methods in EDCI III
Credits 3.3 Lecture Hours.
Framework for understanding distinctions among research methodologies used in the field of curriculum and instruction; includes classes of research questions, methods of collecting and decisioning evidence; basic principles of multivariate statistics and their application in context of various research paradigms.
Prerequisite: EDCI 687.

EDCI 689 Special Topics in...
Credits 1 to 4.1 to 4 Lecture Hours.
Selected topics in an identified area of curriculum and instruction. May be repeated for credit.

EDCI 690 Theory of Curriculum and Instruction Research
Credits 3.3 Lecture Hours.
Theory and design of research problems and experiments in various subfields of curriculum and instruction; communication of research proposals and results; evaluation of current research of faculty and student and review of current literature. May be repeated for credit.

EDCI 691 Research
Credits 1 to 23.1 to 23 Other Hours.
Research for thesis or dissertation.

EDCI 692 Professional Study
Credits 1 to 23.1 to 23 Other Hours.
Approved professional study of project undertaken as the terminal requirement for doctor of education degree. Preparation of a record of study summarizing the rationale, procedure and results of the completed project.
Prerequisite: Approval of major advisor.

EDCI 701 Elementary Science Instructional Strategies and STEM Learning
Credits 3.3 Lecture Hours.
Development of engaging STEM activities using inquiry and project-based learning approaches; creation of appropriate assessments for STEM activities and integrated STEM learning units.
Prerequisite: Graduate classification.
EDCI 702 Elementary Mathematics Instructional Strategies and STEM Learning Credits 3. 3 Lecture Hours. 
Teaching models and the design of elementary mathematics instruction for digital age learners; emphasis on inquiry learning models in science, technology, engineering and mathematics (STEM). 
Prerequisite: Graduate classification.

EDCI 751 Problem-Based Research Frameworks Credits 3. 3 Lecture Hours. 
Introduction to scientific research associated with problems in K-12 curriculum and instruction settings; evaluation and problem solving for effective solutions to educational problems in school-based settings. 
Prerequisite: Graduate classification and admission to online EdD in EDCI.

EDTC - Educational Technology Courses

EDTC 311 Adaptive/Assistive Technology Credits 3. 3 Lecture Hours. 
Comprehensive overview of Adaptive/Assistive Technology (AT) solutions for persons with special needs. 
Prerequisites: Admission to Special Education program; SEFB 311, SEFB 414, SEFB 442, EPFB 484.

EDTC 345 Microcomputer Awareness for Educators Credits 3. 2 Lecture Hours. 2 Lab Hours. 
Focus on both teacher and student utilization; overview of computer operations and instructional integration of word processor, database, spread sheet, and graphics utilities; telecommunications and Internet functions and resources accessed and developed; includes the design, development, and evaluation of instructional materials and integration of MultiMedia and HyperText resources and techniques. 
Prerequisite: Junior classification.

EDTC 489 Special Topics in... Credits 1 to 4. 1 to 4 Lecture Hours. 
Selected topics in an identified area of educational technology. May be repeated for credit. 
Prerequisite: Approval of instructor.

EDTC 602 Educational Technology: Field, Theory, Profession Credits 3. 3 Lecture Hours. 
Introduces the student to the educational technology profession and provides a conceptual map of the theory, research and practice of the field; a historical overview of the field aids in bringing current educational technology practices into perspective. 
Prerequisite: Approval of department head.

EDTC 608 Foundations of Distance Learning Credits 3. 3 Lecture Hours. 
Communication theory, learning theories, and systems theory related to distance learning; application of effective and efficient instructional methodologies to educational/instructional settings via multiple distance education technologies and techniques. 
Prerequisites: EDTC 645 or approval of instructor; approval of department head.

EDTC 613 Integrating Technology in Learning Environments Credits 3. 2 Lecture Hours. 1 Lab Hour. 
Develops a broad understanding of what is involved in designing technology rich environments to support active learning; examines the integration of human learning theories with instructional design and development practices in the selection, preparation, evaluation, and ethics of instructional technology implementation. 

EDTC 621 Graphic Communication and Interface Design Credits 3. 3 Lecture Hours. 
Application of research findings and design principles to the critical analysis of the interfaces of everyday objects, print materials, and Web sites; effective design of graphical displays to communicate functionality and structure; issues related to flawed interfaces, elegant design solutions, user-centered design, usability testing, and Web site accessibility. 
Prerequisite: Approval of department head.

EDTC 631 Educational Video Credits 3. 3 Lecture Hours. 
Design and development of educational video programs using an effect-to-cause model: message definition, scriptwriting, storyboard, production, post-production editing and evaluation; topics include lighting, sound, the operation of digital video cameras, the use of digital editing software, visual effects, compression, video sharing websites, copyright law, production personnel, medium requirements. 
Prerequisite: Approval of instructor.

EDTC 641 Educational Game Design Credits 3. 3 Lecture Hours. 
Formal and dramatic elements of successful non-educational games for principles of effective game design; application principles to the critique of existing educational games; examination commercial games originally designed for entertainment and their use to address educational objectives; games through the lens of multiple theories of learning and motivation, including situated cognition, flow, and systems theory. 
Prerequisites: Graduate classification; approval of department head.

EDTC 642 Designing for Mobile Learning Credits 4. 3 Lecture Hours. 3 Lab Hours. 
Introduction to basics of designing educational applications for mobile devices; emphasis on instructional, visual and human-computer interaction design principles; hands-on design and development work combined with a theoretical approach to designing learning experiences; previous programming experiences not required. 
Prerequisites: Graduate classification; approval of department head.

EDTC 645 Instructional Applications of Computer Technologies I Credits 3. 3 Lecture Hours. 
Introduction to the integration of computers, telecommunications, and related technologies into educational practice; resources for personal productivity and development/delivery of instructional materials; applications for both educators and students (word processing, databases, etc.); projects include hands-on development of HyperText, MultiMedia, and Internet (web-based) resources in participant's own area of study. 
Prerequisite: Approval of department head.

EDTC 646 Instructional Applications of Computer Technologies II Credits 3. 3 Lecture Hours. 
Issues (social, educational, etc.) and techniques associated with educational applications of computers and related resources and techniques (graphics, multimedia, etc.); relationship of course activities and products to individual educational/instructional philosophies; web-supported. 
Prerequisites: Graduate classification; approval of department head.
EDTC 651 Tutorials and Simulations
Credits 3. 3 Lecture Hours.
Application of theory to the design and development of two types of computer-based instructional programs: tutorials and simulations; critique of existing instructional software for K-12 students and adult training programs; guidelines for design decisions related to rich media, navigation, learner/program control, practice, interactivity, and feedback.
Prerequisite: Approval of instructor.

EDTC 654 Instructional Design: Techniques in Educational Technology
Credits 3. 3 Lecture Hours.
Introduces systems approach to instructional design with focus on the functions of systems models in planning, developing and evaluating instruction; use of instructional development models which systematically assure proper instructional design; participants will develop instructional products individually and in groups; a strong theoretical foundation utilized.
Prerequisite: Approval of instructor and department head.

EDTC 655 Instructional Design II
Credits 3. 3 Lecture Hours.
Preparation for leadership in instructional design through exploration of project management, needs assessment, goal analyses, rapid prototyping, problem-based learning, case-based learning, design of learning objects, ID for international audiences, instructional materials and program evaluation; theories that contribute to the field.
Prerequisites: Graduate classification; approval of department head; EDTC 654.

EDTC 656 Computer Graphics: Educational Applications and Production Techniques
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Computer graphics production used in the development of educational materials; acquired skills and knowledges applied to the student's interest area with respect to theoretical and research issues relating to the effective instructional use of print and computer-based instructional materials; techniques include digitizing, image-processing and animation.
Prerequisites: EDTC 645 or approval of instructor; approval of department head.

EDTC 660 Interactive Video/Multimedia: Production and Utilization
Credits 3. 3 Lecture Hours.
Principles and techniques of interactive video/multimedia design and production; practical applications of media (video, digitized video and audio) production techniques and instructional control programs utilizing authoring software; produce materials for interactive instructional programs involving features such as: CD-ROM video and audio, simulations, interactive digital movies, web-based delivery, etc.
Prerequisites: EDTC 645 or approval of instructor; approval of department head.

EDTC 662 Computer Utilization in Educational Research and Practice
Credits 3. 3 Lecture Hours.
Use of computers for application in educational research settings; activities include student/subject monitoring, hardware use and design, automatic data collection; data storage, retrieval, transmission and analysis; web-based research formats are included; projects will relate to major area of study.
Prerequisites: EDTC 645 or approval of instructor; approval of department head.

EDTC 664 Management of Instructional Telecommunication Systems
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Management of Instructional Telecommunication Systems. Analysis of instructional telecommunications needs associated with educational and training programs; analysis, design, development, implementation and evaluation of computer-based management systems.
Prerequisites: EDTC 645 or approval of instructor; approval of department head.

EDTC 668 Applications of Telecommunications in Education
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Instructional applications of telecommunications; analysis of characteristics of varied systems, both dedicated and public networks, and design of appropriate strategies and methods using those systems.
Prerequisites: EDTC 645 or approval of instructor; approval of department head.

EDTC 683 Practicum in Educational Technology
Credits 1 to 3. 1 to 9 Other Hours.
Supervised experience in applied area of educational technology; student will plan and develop an integrative product relating to educational technology theory, practice and equipment.
Prerequisite: Approval of instructor and department head.

EDTC 684 Professional Internship
Credits 1 to 6. 1 to 6 Other Hours.
Supervised experiences in performing professional functions appropriate to career goals.
Prerequisites: Application one month prior to registration; approval of instructor and department head.

EDTC 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed individual study of selected problems in instructional technology not within thesis research and not covered by any other course.
Prerequisite: Approval of instructor and department head.

EDTC 688 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of educational technology. May be repeated for credit.
Prerequisite: Approval of instructor.

EDTC 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research for thesis or dissertation.
Prerequisite: Approval of major advisor and department head.

EHRD - Ed Human Res Develop

Courses

EHRD 101 Learning Community of Leadership Development in Human Resource Development and Technology Management
Credit 1. 1 Lecture Hour.
Exploration of leadership identity, reflection on lessons learned during the first year of college.

EHRD 203 Foundations of Human Resource Development
Credits 3. 3 Lecture Hours.
Overview of the discipline and field of human resource development; focus on how individuals and groups learn and interact with organizations including motivation, group dynamics, systems theory, organizational culture, learning and change.
Prerequisite: Sophomore classification.
EHRD 210 Legal and Ethical Environment of Human Resource Development  
Credits 3.3 Lecture Hours.  
Development of knowledge towards legal and ethical work environment in a corporate and educational setting in human resource development.  
Prerequisite: Sophomore classification.

EHRD 285 Directed Studies  
Credits 0 to 12. 0 to 12 Lecture Hours.  
Directed readings or research problems in industrial education.  
Prerequisites: Freshman or sophomore classification; approval or directed studies application.

EHRD 289 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified area of industrial educational. May be repeated for credit.  
Prerequisite: Approval of instructor.

EHRD 291 Research  
Credits 0 to 4. 0 to 4 Other Hours.  
Research conducted under the direction of faculty member in educational human resource development. May be repeated 2 times for credit.  
Prerequisites: Freshman or sophomore classification and approval of instructor.

EHRD 315 Applied Human Resource Development in the Workplace  
Credits 3.3 Lecture Hours.  
Training and development context and synthesis of general industry-standard human resource practices in workplace environments for human resource practitioners.  
Prerequisites: EHRD 203 and EHRD 210 with a grade of C or better; junior or senior classification.

EHRD 371 Applied Learning Principles  
Credits 3.3 Lecture Hours.  
The overarching purpose of the course is to influence adult educators to make more intentional choices toward developmental growth in their work with adult learners; focus on adult learning theories and work strategies; meets writing intensive course requirement.  
Prerequisites: Junior or senior classification and approval of instructor.

EHRD 372 Training and Development in HRD  
Credits 3.3 Lecture Hours.  
Theory and applications of training and development in organizations; focus on rapid changes in technology, alterations in the cultures of organizations, dynamic market conditions, and the need for information sharing, planning for ongoing skill development in the for-profit and non-profit sectors.  
Prerequisites: Junior or senior classification and approval of instructor.

EHRD 374 Organizational Development  
Credits 3.3 Lecture Hours.  
Introduction to major theories, concepts, skills and techniques for organization development in business and industry, education and the public sector.  
Prerequisites: Junior or senior classification and approval of instructor.

EHRD 391 Measurement and Evaluation in Human Resource Development and Technology Management  
Credits 3.3 Lecture Hours.  
Measurement and evaluation techniques in the field of Human Resource Development and Technology Management; emphasis on understanding, calculation and application of basic testing, assessment and interpretation methods.  
Prerequisites: Junior or senior classification or approval of instructor; EHRD 203 with a grade of C or better; MATH 141 and MATH 142.

EHRD 405 Principles and Practices of Leadership in Human Resource Development and Technology Management  
Credits 3.3 Lecture Hours.  
Theories and concepts associated with learning in individuals and organizations; overview of leadership theories and learning theories within a context of developing leadership programs.  
Prerequisites: Junior or senior classification and approval of instructor.

EHRD 408 Globalization and Diversity in the Workplace  
Credits 3.3 Lecture Hours.  
Assist learners in the identification and understanding of globalization and diversity issues in learning, work and community; exploration of current issues, theories, trends and policy issues.  
Prerequisites: Junior or senior classification and approval of instructor.

EHRD 413 Conflict Management and Dialogue  
Credits 3.3 Lecture Hours.  
Conflict management principles and practices in the workplace; engagement in meaningful conflict from a training and development perspective.  
Prerequisite: Junior or senior classification or approval of instructor.

EHRD 473 Distance Learning Applications  
Credits 3.3 Lecture Hours.  
Application of distance learning principles to educational and training settings via a variety of distance learning modalities.  
Prerequisites: Junior or senior classification and approval of instructor.

EHRD 475 Multimedia Development for Training and Instruction  
Credits 3.3 Lecture Hours.  
Introduction to the development of multimedia as it applies to training and development; examine the application of multimedia principles to educational and training settings for both "face-to-face" and distance applications.  
Prerequisites: Junior or senior classification; or approval of instructor; ISYS 209 or approved substitution.

EHRD 477 Project Management in Organizations  
Credits 3.3 Lecture Hours.  
Application of principles of project management in organizations; focus on the development of project proposals, project planning using project management software; management of project personnel and resources.  
Prerequisite: Junior or senior classification or approval of instructor.

EHRD 479 Grants and Contracts  
Credits 3.3 Lecture Hours.  
Identify funding sources that support research and development activities; identify methods of securing funding; study state, national and private funding sources and how to become successful in submitting to each; complete a proposal to a funding agency and a management plan for a funded project.  
Prerequisites: Junior or senior classification and approval of instructor.
EHRD 481 Capstone Seminar in Human Resource Development and Technology Management
Credits 3.3 Lecture Hours.
Capstone seminar on significant issues in industry; transition from an academic environment to professional business environment; preparation of an individual professional portfolio; steps in searching and securing an internship position. 
Prerequisites: Junior or senior classification; admitted to professional phase; or approval of instructor.

EHRD 484 Professional Internship
Credits 6.6 Other Hours.
Directed internship in an organization to provide students with a learning experience supervised by professionals in organizational settings appropriate to the student's professional objectives. Must be taken on a satisfactory/unsatisfactory basis. 
Prerequisites: Senior classification and approval of instructor, admitted to professional phase, EHRD 481, EHRD 490.

EHRD 485 Directed Studies
Credits 0 to 12. 0 to 12 Other Hours.
Directed readings or research problems in industrial education. Term report required. 
Prerequisite: Approval of department head.

EHRD 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 1 to 4 Lab Hours.
Selected topics in an identified area of industrial education. May be repeated for credit. 
Prerequisite: Approval of instructor.

EHRD 490 Research in Human Resource Development/Technology Management
Credits 3.3 Lecture Hours.
Investigative techniques currently employed in human resource development (HRD) and technology management (TCM) including the context of HRD/TCM research, planning HRD/TCM research, styles of HRD/TCM research, and strategies for data collection and researching. 
Prerequisites: Junior or senior classification; admitted to professional phase; EHRD 391 with a grade of C or better.

EHRD 491 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in human resource development. May be repeated for credit. 
Prerequisite: Junior or senior classification.

EHRD 601 Foundations of Human Resource Development
Credits 3.3 Lecture Hours.
Survey of the set of systematic and planned activities designed by an organization to provide its employees with the necessary skills to meet current and future job demands: learning and human resource development needs assessments, task analysis, designing, implementing and evaluating training programs, career development, organization development. 
Prerequisite: Doctoral classification only.

EHRD 602 Critical Issues in Human Resource Development
Credits 3.3 Lecture Hours.
Critical issues in human resource development; development of workforce through training and development activities. 
Prerequisite: Graduate classification.

EHRD 603 Applied Theoretical Foundations of Human Resource Development
Credits 3.3 Lecture Hours.
Challenges of supervision associated with human resource development settings; how to apply theoretical foundations of human resource development to ensure employees obtain the necessary skills for current and future job demands. 
Prerequisite: Master's classification only.

EHRD 605 Principles and Practices of Leadership in Human Resource Development
Credits 3.3 Lecture Hours.
Development and application of leadership models for human resource development settings; introduce and examine historical, philosophical and theoretical aspects of leadership; explore and evaluate the ethical and influence dimensions of leadership; critically examine the contemporary research characteristics of effective leadership. 
Prerequisite: Graduate classification.

EHRD 606 Project Management in Human Resource Development
Credits 3.3 Lecture Hours.
The use of established project management theory, tools, practices and technology toward the effective management of organizational processes, projects, and programs in universities, government, business, and industry.

EHRD 607 International Human Resource Development
Credits 3.3 Lecture Hours.
Organization, delivery, and management of human resource development programs in multinational and global corporate settings. 
Prerequisite: Graduate classification.

EHRD 612 Training and Development in Human Resource Development
Credits 3.3 Lecture Hours.
Overview of the process of planning, implementing and evaluating training and development in a variety of settings; includes conceptual tools needed to develop and design training. 
Prerequisite: Graduate classification.

EHRD 613 Career Development in Human Resource Development
Credits 3.3 Lecture Hours.
Foundations for developing expertise in the area of career development; content to serve to expand knowledge and prepare individuals for optimizing human resources in human resource development organizations; focusing on programs, methods, practices, and techniques by combining personal and organizational factors. 
Prerequisite: Graduate classification.

EHRD 614 Strategic Planning for Human Resource Development
Credits 3.3 Lecture Hours.
Strategic planning in Human Resource Development (HRD); elements for training, career and organizational development; mission, values and culture, vision, audit analysis and modeling. 
Prerequisite: Graduate classification.

EHRD 616 Methods of Teaching Adults
Credits 3.3 Lecture Hours.
Selection and use of appropriate instructional design strategies in teaching adults.
EHRD 618 Evaluation Models in Human Resource Development  
Credits 3. 3 Lecture Hours.  
Providing instruction, insights, and learning experiences regarding educational human resource development applications of and relationships among five leading types of evaluation: needs assessment, program design/delivery, performance outcomes, impact assessment, and efficiency/ROI.

EHRD 620 Emotions in Education and Industry  
Credits 3. 3 Lecture Hours.  
Exploring and understanding the emotional foundations of effective working relationships among teachers, trainers and trainees in educational, industrial and business settings. 
Prerequisite: Graduate classification.

EHRD 621 Communication in Human Resource Development  
Credits 3. 3 Lecture Hours.  
Visual, oral, written and computer-based communication processes and their application in organizations, interpersonal interactions and small group settings in human resources development. 
Prerequisite: Graduate classification.

EHRD 622 Training Task Analysis  
Credits 3. 3 Lecture Hours.  
Developing an understanding of the theory and practice of performance and needs analysis as applied in the public and private employment sectors; reviewing of the current issues related to job task analysis. 
Prerequisite: Graduate classification.

EHRD 624 Change Theory  
Credits 3. 3 Lecture Hours.  
Conceptual tools needed to understand theories of change and to develop ways of operationalizing change for education and research. 
Prerequisite: Graduate classification.

EHRD 625 Organization Development and Performance in Human Resource Development  
Credits 3. 3 Lecture Hours.  
Introduction to major theories, concepts, skills, and techniques for the practice and management of organization change and development in various organizational performance contexts and human resource development settings. 
Prerequisite: Graduate classification.

EHRD 627 Research and Development in Educational Human Resource Development  
Credits 3. 3 Lecture Hours.  
Methods of conducting research programs in educational human resource development; defining the research problem and overview of quantitative, qualitative, action research, and mixed methods.

EHRD 628 Research and Publishing in Human Resource Development  
Credits 3. 3 Lecture Hours.  
The role of research in human resource development; emerging themes in research; criteria for evaluating research; critique of past and future presentations; the role of professionalism and professional organizations in human resource development; offered in association with the annual conference of the Academy of Human Resource Development. 
Prerequisites: Graduate classification.

EHRD 630 Adult Learning  
Credits 3. 3 Lecture Hours.  
Research and theory in adult learning; factors influencing the adult learning process; and how adult development intersects with learning in adulthood.

EHRD 631 Foundations of Adult Education  
Credits 3. 3 Lecture Hours.  
Fundamental concepts and definitions relating to adult education as a field of study; major historical developments and philosophical roots of adult education from a sociocultural and global perspective; diverse institutional commitments and responses to adult learner needs; administrative, programming, and instructional practices in the field.

EHRD 633 Adult Literacy Education  
Credits 3. 3 Lecture Hours.  
Important aspects of implementing literacy programs for adults; funding, recruiting, placement, counseling and using community resources.

EHRD 634/WGST 634 Introduction to Gender and Education  
Credits 3. 3 Lecture Hours.  
Major discussions and debates in the area of gender and education, with particular attention to the role that feminism and feminist theory have played on the intersections of gender, race, class, ethnicity and sexuality. 
Prerequisite: Graduate classification.  
Cross Listing: WGST 634/EHRD 634.

EHRD 636 Working with Adult Groups  
Credits 3. 3 Lecture Hours.  
Development of skills for facilitating productivity in task-oriented groups of adults. Issues, problems and concepts frequently encountered, and potential solutions.

EHRD 637 Workforce Development  
Credits 3. 3 Lecture Hours.  
Evaluation of the workforce and the development of research techniques for identifying, assessing and evaluating the needs of industry for a quality workforce; models for staffing, curriculum needs, and program development designed and evaluated. 
Prerequisite: Graduate classification.

EHRD 638 Issues in Adult Education  
Credits 3. 3 Lecture Hours.  
Pressing contemporary issues within the field of adult education; explores issues and their impact on adult education research, theory, and practice. Specific topics addressed each semester offered.

EHRD 641 Evaluation of Adult Teaching and Learning  
Credits 3. 3 Lecture Hours.  
Introduces a variety of approaches to assessment and provides experience in developing the appropriate materials of adult learning in adult settings. 
Prerequisite: Graduate classification.

EHRD 642 Program Development in Adult Education  
Credits 3. 3 Lecture Hours.  
Conceptual tools needed to develop educational programs for adults in a variety of settings; concepts of planning, implementation and evaluation.

EHRD 643 Adult Education, Globalization and Social Justice  
Credits 3. 3 Lecture Hours.  
Impact of globalization on individuals and groups across nations; issues of access and opportunity; societal versus individual change and the meaning of international development. 
Prerequisite: Graduate classification.

EHRD 647 Education for the Older Adult  
Credits 3. 3 Lecture Hours.  
Older adults as unique learners--defining specific physical and psychosociological differences between older adults and other learners; educational implications of specific needs and current educational programs to meet those needs. 
Prerequisite: Graduate classification.
EHRD 649/WGST 649 Feminist Pedagogy  
Credits 3.3 Lecture Hours.  
Explores how educational systems and institutions have regarded women historically and contemporarily; considers practical and theoretical writings on feminist pedagogy.  
Prerequisites: EHRD 634/WGST 634.  
Cross Listing: WGST 649/EHRD 649.

EHRD 650/WGST 650 Gender and International Education  
Credits 3.3 Lecture Hours.  
Explores the intersection of formal and informal education and understandings of gender in countries beyond the United States.  
Prerequisites: EHRD 634/WGST 634.  
Cross Listing: WGST 650/EHRD 650.

EHRD 651 Models of Epistemology and Inquiry in Educational Human Resource Development  
Credits 3.3 Lecture Hours.  
Inquiry in various epistemology paradigms outlined by Habermas and links to the outcomes of the research process.

EHRD 655 Qualitative Research Methods  
Credits 3.3 Lecture Hours.  
Introduction to qualitative research methods; theoretical underpinnings; the research paradigm and applied experience with the methodology.  
Prerequisite: EHRD 651 or equivalent.

EHRD 656 Narrative Analysis  
Credits 3.3 Lecture Hours.  
Analysis of narratives; study of the theory behind “the narrative turn” in qualitative research; explore and apply various approaches to analyzing narratives in terms of both structure and their content.  
Prerequisite: EHRD 655 or equivalent.

EHRD 657 Life History Research  
Credits 3.3 Lecture Hours.  
Examines qualitative research that focuses on life experience both in its entirety (life history; biography and autobiography) and with specificity around a particular event (autoethnography); explores the nature of these types of qualitative research and discussing the methodological issues inherent in each mode.  
Prerequisite: EHRD 655 or equivalent.

EHRD 670 Women and Education  
Credits 3.3 Lecture Hours.  
Critical, theoretical and practical issues related to women and education.  
Prerequisite: Graduate classification.

EHRD 671 Management of Distance Learning Systems  
Credits 3.3 Lecture Hours.  
Organization, management and administration of distance learning systems; funding delivery systems and policy.  
Prerequisite: EHRD 673 or equivalent.

EHRD 673 Introduction to Distance Learning  
Credits 3.3 Lecture Hours.  
Introduction to the field of distance learning; application of distance learning principles to training settings via a variety of distance learning modalities; examination of the concepts surrounding distance learning, the theories that underpin the field, and the impact that they have on practice.  
Prerequisite: Graduate classification.

EHRD 674 Distance Networking for Training and Development  
Credits 3.3 Lecture Hours.  
Development of knowledge towards application of telecommunications networking in corporate training settings; technical alternatives for delivery of subject matter for trainers.  
Prerequisite: Graduate classification.

EHRD 675 Women and Organizational Leadership  
Credits 3.3 Lecture Hours.  
Historical, theoretical, ethical and legal issues relevant to women leaders in organizational contexts; skills development and practical approaches to effective leadership.

EHRD 679 Procurement of Contracts and Grants  
Credits 3.3 Lecture Hours.  
Funding sources that support research and development activities; identify methods of securing funding; study state, national and private funding sources and how to become successful in submitting to each; complete a proposal to a funding agency; and a management plan for a funded project.  
Prerequisite: Graduate classification.

EHRD 681 Seminar  
Credit 1.1 Lecture Hour.  
Issues pertinent to adult education and/or educational human resource development and research in appropriate areas. Master of Science students seeking the HRD option will develop a professional portfolio documenting progress through the individual’s program, highlighting goals, beliefs and reflections of learning outcomes associated with the program.

EHRD 683 Practicum in Educational Human Resource Development  
Credits 1 to 6.1 to 6 Lecture Hours.  
Field-based practicum in theory and strategies for researching and delivering programs within a variety of educational human resource development settings. May be taken two times.  
Prerequisite: Approval of advisor.

EHRD 684 Professional Internship  
Credits 1 to 6.1 to 6 Other Hours.  
Supervised experiences in performing professional functions appropriate to career goals.  
Prerequisite: Approval of committee chair.

EHRD 685 Directed Studies  
Credits 1 to 6.1 to 6 Other Hours.  
Directed individual study of selected problems in the fields of educational human resource development and adult education. Students may register up to but no more than two sections of this course in the same semester.

EHRD 689 Special Topics in...  
Credits 1 to 4.1 to 4 Lecture Hours.  
Selected topics in adult education and human resource development. May be repeated for credit.

EHRD 690 Theory of Educational Human Resource Development Research  
Credits 3.3 Lecture Hours.  
Theory and design of research and inquiry in various applications of models and research procedures including quantitative analyses, naturalistic inquiry, research design and preparation of research proposals, as they relate to the discipline of educational human resource development and adult education.  
Prerequisite: EHRD 651 or equivalent.

EHRD 691 Research  
Credits 1 to 23.1 to 23 Other Hours.  
Research for thesis or dissertation.
ENDG - Engr Design Graphics

Courses

ENDG 105 Engineering Graphics
Credits 2. 1 Lecture Hour. 3 Lab Hours.
(ENGR 1204, 1304) Engineering Graphics. Graphical approach to the engineering design process as applied to products; methods of graphical communications, three-dimensional geometry, working drawings, data analysis, computer graphics, introduction to team dynamics and creative problem solving.

Prerequisite: ENDS 105.

ENDG 407 Computer Design Graphics
Credits 3. 3 Lecture Hours.
Use of microcomputers with currently available CAD software as an aid in the design process and as a means of increasing engineering productivity. Review of ANSI standards and an introduction to a variety of computer graphics applications encountered in industry; user-oriented.

Prerequisite: ENDG 405 or ENGR 112 or equivalent.

ENDG 408 Computer Graphics
Credits 3. 3 Lecture Hours.
Current applications of computer graphics to produce orthographic views and rendered pictorials; introduction to several computer graphics software packages including applications in 3-D, parametric solid modeling, animation and rapid prototyping.

Prerequisite: ENDG 105 or ENDG 407 or ENGR 112.

ENDG 409 Professional Computer Animation
Credits 3. 3 Lecture Hours.
Advanced studies in computer graphics with an emphasis on the intricacies of graphical design and how it applies to a cohesive project design.

Prerequisites: ENDG 407 and 408; junior or senior classification.

ENDG 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Special problems in engineering design graphics to fit needs of individual students.

Prerequisite: Approval of instructor.

ENDS 106 Design Foundations II
Credits 4. 1 Lecture Hour. 6 Lab Hours.
(ARCH 1404) Design Foundations II. Approaches to problem identification and problem solving emphasizing an awareness of human, physical and cultural factors influencing design; reinforcement of visual and verbal communication as applied to the design process.

Prerequisite: ENDS 105.*

ENDS 114 Introduction to Design Communication
Credits 3. 1 Lecture Hour. 4 Lab Hours.
Introduction to drawing methods for non-majors; free hand drawing as a creative and communicative tool to express design thinking, architectural form and space.

ENDS 117 Design Communication Foundations
Credits 3. 1 Lecture Hour. 4 Lab Hours.
(ARCH 1307, 1407) Design Communication Foundations. Introduction to and practice of tools, methods, techniques available for graphic communication; graphic communication and the design process; observation and other forms of free-hand drawing and drawing systems that develop representational and descriptive capabilities.

Prerequisites: Classification in environmental design and concurrent enrollment in ENDS 105.

ENDS 116 Design Communication Foundations II
Credits 3. 1 Lecture Hour. 4 Lab Hours.
(ARCH 1308, 1408) Design Communication Foundations II. Introduction to design drawing using a wide variety of tools ranging from conventional drafting and drawing equipment to the latest digital graphic applications; a focused investigation of analytical drawing as it contributes to the design process; experience of a wide variety of drawing conventions intended to equip students to navigate a design process.

Prerequisites: ENDS 115 and concurrent enrollment in ENDS 106.

ENDS 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Special problems in environmental design. May be repeated for up to 12 credit hours.

Prerequisite: Approval of instructor and degree coordinator.

ENDS 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified field of engineering design graphics.

Prerequisite: Approval of instructor.

ENDS - Environmental Design

Courses

ENDS 101 Design Process
Credits 3. 3 Lecture Hours.
(Arch 1311) Design Process. Fundamental design processes, issues and theories relevant to design resolution and the creation of new ideas; creative thought processes from the formation of ideas through incubation to final product and future impact on the physical environment and society.

ENDS 105 Design Foundations I
Credits 4. 1 Lecture Hour. 6 Lab Hours.
(ENGR 1403) Design Foundations I. Visual and functional design principles; development of skills in perception, thought and craft as they apply to the formation of two- and three-dimensional relationships; design attitudes and environmental awareness.

Prerequisite: Classification in environmental design and concurrent enrollment in ENDS 115.*

END 103 Introduction to Rhetoric and Composition
Credits 3. 3 Lecture Hours.
(ENGL 1301) Introduction to Rhetoric and Composition. Intensive study of and practice in writing processes, from invention and researching to drafting, revising and editing, both individually and corroboratively; emphasis on effective rhetorical choices including audience, purpose, arrangement and style; focus on writing the academic essay as a vehicle for learning, communicating and critical analysis.
ENGL 104 Composition and Rhetoric  
Credits 3.3 Lecture Hours.  
(ENGL 1302) Composition and Rhetoric. Focus on referential and persuasive researched essays through the development of analytical reading ability, critical thinking and library research skills; for freshman and sophomore students only.

ENGL 201 Approaches to Literacy  
Credits 3.3 Lecture Hours.  
Origins, functions, and philosophies of literacy; theories of text analysis; development of a broader concept of literacy; enhancement of instruction of communication skills.

ENGL 202 Environmental Literature  
Credits 3.3 Lecture Hours.  
Texts from various periods and locations and in various genres and media that focus on the relationship of human beings to the rest of the natural world; topics vary from each section.

ENGL 203 Writing about Literature  
Credits 3.3 Lecture Hours.  
Exploration of literature by genre and/or theme; literary analysis and interpretation; intensive writing about literature.

ENGL 204/AFST 204 Introduction to African-American Literature  
Credits 3.3 Lecture Hours.  
Introduction to the writings of African Americans from the 18th century to the present, emphasizing the major themes and traditions.  
Cross Listing: AFST 204/ENGL 204.

ENGL 205/AFST 205 Introduction to Africana Literature  
Credits 3.3 Lecture Hours.  
Works, literary movements and genres of authors of African descent in the Americas, Europe and Africa.  
Cross Listing: AFST 205/ENGL 205.

ENGL 206 Twenty-first Century Literature and Culture  
Credits 3.3 Lecture Hours.  
Exploration of contemporary literature and culture; such topics as the new multicultural millennium; responses to September 11 and new global realities; the transformation of popular genres.

ENGL 209/LING 209 Introduction to Linguistics  
Credits 3.3 Lecture Hours.  
Nature of human language and of linguistics; includes an introduction to phonology, syntax, semantics and morphology and the role of spoken and written discourse in sustaining societal arrangements.  
Cross Listing: LING 209/ENGL 209.

ENGL 210 Technical and Business Writing  
Credits 3.3 Lecture Hours.  
(ENGL 2311) Technical and Business Writing. Focus on writing for professional settings; correspondence and researched reports fundamental to the technical and business workplace—memoranda, business letters, research proposals and presentations, use of graphical and document design; emphasis on audience awareness, clarity of communication and collaborative team-work.

ENGL 211 INTS 211 Foundations in Cultural Studies  
Credits 3.3 Lecture Hours.  
Introduction to history, influence and major ideas of Cultural Studies; use of culture as a means to critique social problems and understand social forces; analysis of culture in its relationship to power; participation in project investigating contemporary U.S. youth subcultures.  
Cross Listing: INTS 211/ENGL 211.

ENGL 212 Shakespeare  
Credits 3.3 Lecture Hours.  
Exploration of selected works of Shakespeare.

ENGL 219 Literature and the Other Arts  
Credits 3.3 Lecture Hours.  
Imaginative literature in conversation with aesthetic principles and such other arts as painting, sculpture, architecture, film and music.

ENGL 221/MODL 221 World Literature  
Credits 3.3 Lecture Hours.  
(ENGL 2332) World Literature. Survey of world literature from the ancient world through the sixteenth century in relation to its historical and cultural contexts; texts selected from a diverse group of authors, traditions and genres.  
Cross Listing: MODL 221/ENGL 221.

ENGL 222/MODL 222 World Literature  
Credits 3.3 Lecture Hours.  
(ENGL 2333) World Literature. Survey of world literature from the seventeenth century to the present in relation to its historical and cultural contexts; texts selected from a diverse group of authors, traditions and genres.  
Cross Listing: MODL 222/ENGL 222.

ENGL 227 American Literature: The Beginnings to Civil War  
Credits 3.3 Lecture Hours.  
(ENGL 2327) American Literature: The Beginnings to Civil War. Representative writers, genres and movements of the period.

ENGL 228 American Literature: Civil War to Present  
Credits 3.3 Lecture Hours.  
(ENGL 2328) American Literature: Civil War To Present. Expressions of the American experience in realism, regionalism and naturalism; varieties of modernist and contemporary writing; the rise of ethnic literature and experimental literary forms.

ENGL 231/ MODL 221 Survey of English Literature I  
Credits 3.3 Lecture Hours.  
(ENGL 2322) Survey of English Literature I. Literature of England from Anglo-Saxon times through the 18th century.

ENGL 232 Survey of English Literature II  
Credits 3.3 Lecture Hours.  
(ENGL 2323) Survey of English Literature II. Literary works from the late 18th century to the 21st century by authors in Great Britain and its colonies.

ENGL 235 Elements of Creative Writing  
Credits 3.3 Lecture Hours.  
(ENGL 2307) Elements of Creative Writing. Initiation into the craft of creative writing in prose and poetry; extensive reading in the genres; peer workshops.

ENGL 241 Advanced Composition  
Credits 3.3 Lecture Hours.  
Focuses on the writing of advanced academic and professional prose by integrating computer technology in the analysis and production of that prose.

ENGL 251/FILM 251 Introduction to Film Analysis  
Credits 3.3 Lecture Hours.  
Fundamental aspects of film analysis and criticism.  
Cross Listing: FILM 251/ENGL 251.

ENGL 285 Directed Studies  
Credits 0 to 4.0 to 4 Other Hours.  
Readings selected for specific need of major or minor in English.
ENGL 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of English. May be repeated for credit.

ENGL 291 Research
Credits 0 to 3. 0 to 3 Lecture Hours.
Research conducted under the direction of faculty member in English.
Prerequisites: 3 hours of 200-level literature; freshman or sophomore classification and approval of instructor.

ENGL 303 Approaches to English Studies
Credits 3. 3 Lecture Hours.
A writing intensive exploration of the methodologies and major topics of English studies.
Prerequisite: ENGL 104 or registration therein; junior or senior classification or approval of instructor.

ENGL 304 Topics in Digital Research
Credits 3. 3 Lecture Hours.
Topics in the studies of digital humanities; introduction to making/interpreting digital materials, the surrogates of books, paintings, etc., that form our cultural heritage, as well as digitally-born literature, art and culture; reflection on digital cultures/digital archives; theory and practice of creating and researching digital resources. May be taken three times for credit.
Prerequisite: Junior or senior classification or approval of instructor.

ENGL 308 History of Literary Criticism
Credits 3. 3 Lecture Hours.
History of literary thought from antiquity to the present, including writers such as Plato, Aristotle, "Longinus," Sidney, Shelley, and Dryden; analysis of genres such as tragedy, lyric, and film; critical approaches such as new criticism, structuralism, deconstruction, Marxism, feminism, new historicism, and film studies.
Prerequisite: 3 credits of literature at 200-level or above.

ENGL 310/LING 310 History of the English Language
Credits 3. 3 Lecture Hours.
Phonological, grammatical and lexical history of the English language; brief discussion of some other Indo-European languages; principles of linguistic change, as reflected in English.
Prerequisite: LING 209/ENGL 209 or ENGL 209/LING 209.
Cross Listing: LING 310/ENGL 310.

ENGL 313 Medieval English Literature
Credits 3. 3 Lecture Hours.
Old and Middle English literature exclusive of Chaucer, including such authors and works as Beowulf, The Dream of the Rood, Sir Gawain and the Green Knight, Piers Plowman, Malory, Julian of Norwich, Kempe, the mystery plays and the lyrics.
Prerequisite: 3 credits of literature at 200-level or above.

ENGL 314 The English Renaissance
Credits 3. 3 Lecture Hours.
Period course in the poetry, prose and drama of England in the 16th century.
Prerequisite: 3 credits of literature at 200-level or above.

ENGL 315 Seventeenth-Century Literature
Credits 3. 3 Lecture Hours.
Period course in English poetry, prose and drama of the 17th century.
Prerequisite: 3 credits of literature at 200-level or above.

ENGL 316 Eighteenth-Century Literature and Culture
Credits 3. 3 Lecture Hours.
Period course in English poetry, prose and drama of the 18th century.
Prerequisite: 3 credits of literature at 200-level or above.

ENGL 317 Early British Drama
Credits 3. 3 Lecture Hours.
Period course in early British, non-Shakespearean drama to 1642.
Prerequisite: 3 credits of literature at the 200-level or above.

ENGL 320 Technical Editing and Writing
Credits 3. 3 Lecture Hours.
Clarifying, reducing, expanding and synthesizing such technical materials created by others as manuals, annual reports, and technical articles and reports; audience adaptation, invention, organization, style and mechanics explored.
Prerequisite: ENGL 210.

ENGL 321 Nineteenth-Century Literature (Romantic)
Credits 3. 3 Lecture Hours.
Representative texts in English generated throughout the British empire in the late-18th and early-19th centuries.
Prerequisite: 3 credits of literature at 200-level or above.

ENGL 322 Nineteenth-Century Literature (Victorian)
Credits 3. 3 Lecture Hours.
Period course in English poetry and prose of major Victorian authors.
Prerequisite: 3 credits of literature at 200-level or above.

ENGL 323 The American Renaissance
Credits 3. 3 Lecture Hours.
Period course in the American Renaissance, covering such writers as Emerson, Hawthorne, Thoreau, Alcott, Fuller, Douglass, Melville, Poe, Stowe and Whitman.
Prerequisite: 3 credits of literature at 200-level or above.
Cross Listing: AFST 329/ENGL 329.

ENGL 330 Arthurian Literature
Credits 3. 3 Lecture Hours.
Legend of King Arthur in English and American literature from its Medieval origins to the present.
Prerequisite: Junior or senior classification.

ENGL 331 Fantasy Literature
Credits 3. 3 Lecture Hours.
An exploration of origins and development of fantasy literature, including representative writers, genres and texts.
Prerequisites: Junior or senior classification.

ENGL 333/WGST 333 Gay and Lesbian Literature
Credits 3. 3 Lecture Hours.
Gay and lesbian literature from classical times to present, studied in its historical and cultural context.
Prerequisite: Junior or senior classification.
Cross Listing: WGST 333/ENGL 333.

ENGL 334 Science Fiction Present and Past
Credits 3. 3 Lecture Hours.
Origins and development of the science fiction genre.
Prerequisite: Junior or senior classification.

ENGL 336 Life and Literature of the Southwest
Credits 3. 3 Lecture Hours.
Exploration of Southwestern literature, including such authors as Abbey, Anaya, Cabeza de Vaca, Cather, Krutch, McCarty, Momaday, Paz, Paredes and Porter.
Prerequisite: Junior or senior classification.
ENGL 337 Life and Literature of the American South
Credits 3. 3 Lecture Hours.
Study of writing and culture of the American South based on reading and analysis of key texts by representative authors.
Prerequisite: Junior or senior classification.

ENGL 338 American Ethnic Literature
Credits 3. 3 Lecture Hours.
Multi-ethnic study of American Literature, the writings of Black Americans, American Indians, Latinos/Latinas, Jewish Americans, as well as other ethnic groups.
Prerequisite: Junior or senior classification.

ENGL 339/AFST 339 African-American Literature Post-1930
Credits 3. 3 Lecture Hours.
Major works of the African-American literary tradition from the 1930s to the present studied in their cultural and historical context.
Prerequisites: 3 credits of literature at 200-level or above.
Cross Listing: AFST 339/ENGL 339.

ENGL 340 Modern and Contemporary Drama
Credits 3. 3 Lecture Hours.
Representative plays and performances from the late nineteenth century to the present.
Prerequisite: 3 credits of literature at 200-level or above.

ENGL 345 Writers' Studies: Prose and Poetry
Credits 3. 3 Lecture Hours.
Writers' Studies: Prose or Poetry. A different topic for fiction writers or poets each term; may include historical development of genres; connection between biography and artistic production; study of writers' theories of the art of fiction or poetry.
Prerequisites: ENGL 235; junior or senior classification.

ENGL 347 Writers' Workshop: Prose
Credits 3. 3 Lecture Hours.
Production of advanced, complete stories; peer workshops; extensive reading. May be repeated 1 time for credit.
Prerequisite: ENGL 235; junior or senior classification or approval of instructor.

ENGL 348 Writers' Workshop: Poetry
Credits 3. 3 Lecture Hours.
Production of advanced, complete poems; peer workshops; extensive reading. May be repeated 1 time for credit.
Prerequisite: ENGL 235; junior or senior classification or approval of instructor.

ENGL 350 Twentieth-Century Literature to World War II
Credits 3. 3 Lecture Hours.
Novelists, poets and dramatists writing in English from the late nineteenth to mid-twentieth century.
Prerequisite: 3 credits of literature at 200-level or above.

ENGL 351/FILM 351 Advanced Film
Credits 3. 3 Lecture Hours.
A different film topic each term; sample topics: major directors, historical periods, fiction into film, film genres. May be repeated for credit.
Prerequisite: ENGL 251/FILM 251 or FILM 251/ENGL 251 or FILM 301 or approval of instructor; junior or senior classification.
Cross Listing: FILM 351/ENGL 351.

ENGL 352 Literature, World War II to Present
Credits 3. 3 Lecture Hours.
Novelists, poets and dramatists from the World War II era to the present.
Prerequisite: 3 credits of literature at 200-level or above.

ENGL 353 History of Rhetoric
Credits 3. 3 Lecture Hours.
Exploration of the major approaches to the theory and practice of oral and written rhetoric and discourse up to the end of the 19th century.
Prerequisite: Junior or senior classification.

ENGL 354 Modern Rhetorical Theory
Credits 3. 3 Lecture Hours.
Study of 20th and 21st century rhetorical theories and theorists; focus on relationships among rhetoric and culture, such as rhetoric in oral and textual communities, rhetoric as a method of literary interpretation, rhetoric and linguistics, rhetoric as theorized and taught across academic communities.
Prerequisite: Junior or senior classification.

ENGL 355 The Rhetoric of Style
Credits 3. 3 Lecture Hours.
Fosters an appreciation for and better understanding of English prose style; the history of English prose; representative prose models for analysis and imitation; the impact of computer analysis.
Prerequisite: Junior or senior classification.

ENGL 356/FILM 356 Literature and Film
Credits 3. 3 Lecture Hours.
Study of 20th and 21st century rhetorical theories and theorists; focus on relationships among rhetoric and culture, such as rhetoric in oral and textual communities, rhetoric as a method of literary interpretation, rhetoric and linguistics, rhetoric as theorized and taught across academic communities.
Prerequisite: Junior or senior classification.

ENGL 357 Native American Rhetorics and Literatures
Credits 3. 3 Lecture Hours.
Examination of Native American rhetorics and literatures with a focus on the relationship between composed, performed, and material rhetorics; covering Native American rhetors and writers from pre-colonization to the present and contextualizing them within contemporary Native issues.
Prerequisite: Junior or senior classification or approval of instructor.

ENGL 359 Forms of Creative Writing
Credits 3. 3 Lecture Hours.
Major forms of writing in prose or poetry, depending on instructor; analysis of structure coupled with writing assignments illustrating principles of form in narrative and/or lyrical modes.
Prerequisites: ENGL 235; junior or senior classification.

ENGL 360 Literature for Children
Credits 3. 3 Lecture Hours.
Representative writers, genres, texts and movements.
Prerequisite: Junior or senior classification.

ENGL 361 Young Adult Literature
Credits 3. 3 Lecture Hours.
Survey of historical and contemporary literature for adolescents, including such forms as fantasy, domestic fiction, and the problem novel.
Prerequisite: Junior or senior classification.
ENGL 362/HISP 362 Latino/a Literature
Credits 3. 3 Lecture Hours.
Literature by U.S.-based Latino/a authors writing mostly in English; examination of historical and social contexts of cultural production; may include novels, poetry, short stories, plays, and films to gain understanding of aesthetic expression of diverse Latino/a authors, including but not limited to Mexican Americans, Puerto Ricans, Cuban Americans, and Dominican Americans.
Prerequisite: Junior or senior classification.
Cross Listing: HISP 362/ENGL 362.

ENGL 365/RELS 360 The Bible as Literature
Credits 3. 3 Lecture Hours.
Prerequisite: Junior or senior classification.
Cross Listing: RELS 360/ENGL 365.

ENGL 372 American Poetry
Credits 3. 3 Lecture Hours.
Exploration of the development of American poetic traditions, with an emphasis on the major poetry of 19th and 20th centuries.
Prerequisite: 3 credits of literature at 200-level or above.

ENGL 373 American Realism and Naturalism
Credits 3. 3 Lecture Hours.
Exploration of the literature produced in the United States between the Civil War and World War I, such as works by Twain, James, Freeman, Jewett, Chesnutt, Crane, Dreiser, Wharton.
Prerequisites: 3 credits of literature at 200-level or above.

ENGL 374/WGST 374 Women Writers
Credits 3. 3 Lecture Hours.
History of literature by women in English; emphasis on continuity of ideas and on literary contributions; study of a variety of genres with particular attention to the significance of gender in the racial, social, sexual and cultural contexts of women writing in English.
Prerequisite: Junior or senior classification.
Cross Listing: WGST 374/ENGL 374.

ENGL 375 Nineteenth-Century American Novel
Credits 3. 3 Lecture Hours.
An exploration of the development of the American novel; study of representative novels from the early national period, the American Renaissance, and realism and naturalism.
Prerequisite: 3 credits of literature at 200-level or above.

ENGL 376 The American Novel Since 1900
Credits 3. 3 Lecture Hours.
Representative novels of 20th and 21st century American writers; emphasis on varied literary movements and on thematic and formal innovations as reflections of/responses to social transformations in American society since 1900.
Prerequisite: Junior or senior classification.

ENGL 377 The British Novel to 1870.
Credits 3. 3 Lecture Hours.
Representative works illustrating the development of the novel, by writers resident in Great Britain and its colonies, from its beginnings to the late nineteenth century.
Prerequisite: 3 credits of literature at 200-level or above.

ENGL 378 The British Novel, 1870 to Present.
Credits 3. 3 Lecture Hours.
Representative works illustrating development of the novel by writers resident in Great Britain and its colonies from the late nineteenth century forward.
Prerequisite: Junior or senior classification.

ENGL 379/AFST 379 Postcolonial Literatures
Credits 3. 3 Lecture Hours.
Exploration of key terms, themes and debates within global literature written by colonized, occupied and diasporic peoples.
Prerequisites: 3 credits of literature at the 200-level or above.
Cross Listing: AFST 379/ENGL 379.

ENGL 385 Playwriting
Credits 3. 3 Lecture Hours.
The craft of writing plays and practical experience in writing plays of various lengths; structure, building of ideas into dramatic situations, use of dialogue and movement.
Prerequisite: ENGL 235; junior or senior classification or approval of instructor.

ENGL 386 Creative Nonfiction
Credits 3. 3 Lecture Hours.
Practical study and application of literary nonfiction, the general audience essay, the memoir, and related nonfiction forms; with extensive workshop time and attention given to student writing, expert and peer review as well as readings from authors in the genre.
Prerequisites: ENGL 235; junior or senior classification.

ENGL 390 Studies in British Literature
Credits 3. 3 Lecture Hours.
Exploration of a significant topic or period in British literature; features current faculty research on such topics as Victorian fantasy literature, social identity in medieval Britain and Ireland and children in film.
Prerequisites: 3 credits of literature at 200-level or above; junior or senior classification.

ENGL 391 Folklore, Literature, and World Cultures
Credits 3. 3 Lecture Hours.
Theories of folklore and vernacular culture; exploration of the relationship between oral literature and the forms of vernacular culture, including film, festival and dance.
Prerequisites: Junior or senior classification.

ENGL 392/RELS 392 Studies in Literature, Religion and Culture
Credits 3. 3 Lecture Hours.
Exploration of literature treating significant religious topics in the context of cultural setting; features current faculty research on such topics as Tolkien and the making of myth, C.S. Lewis, texts and cultures of the Middle East and Victorian women writers and religion.
Prerequisites: 3 credits of literature at 200-level or above; junior or senior classification.
Cross Listing: RELS 392/ENGL 392.

ENGL 393/AFST 393 Studies in Africana Literature and Culture
Credits 3. 3 Lecture Hours.
Literary movements, genres, groups of authors, topics or issues in the literature and culture of people of African descent.
Prerequisites: 3 credits of literature at 200-level or above; junior or senior classification or approval of instructor.
Cross Listing: AFST 393/ENGL 393.
ENGL 394 Studies in Genre
Credits 3. 3 Lecture Hours.
Theory and practice of a single genre including analysis of its history and development; features current faculty research on such topics as women standup comics, British short stories and Irish history on stage and screen. May be repeated once for credit.
Prerequisites: 3 credits of literature at 200-level or above; junior or senior classification.

ENGL 396 Studies in American Literature
Credits 3. 3 Lecture Hours.
Exploration of a significant topic or period in American literature; features current faculty research on such topics as Asian-American women writers, American music and literature and American Gothic.
Prerequisites: 3 credits of literature at 200-level or above; junior or senior classification.

ENGL 401 Contemporary Literary Theory
Credits 3. 3 Lecture Hours.
Exposure to the discourses of contemporary theory in engagement with other academic disciplines; study of major theoretical schools, debates, and critiques.
Prerequisites: 3 credits of literature at the 300-level; junior or senior classification.

ENGL 403 Language and Gender
Credits 3. 3 Lecture Hours.
Language and gender from a sociolinguistic perspective; gender in the words and structures of language; gender representation and gendered language use in the media and a variety of sociocultural contexts; language use in intimate relationships; computer-mediated discourse; language, sexuality, and sexual orientation.
Prerequisite: Junior or senior classification.
Cross Listing: LING 403 and WGST 403.

ENGL 412 Studies in Shakespeare
Credits 3. 3 Lecture Hours.
Advanced study of a significant topic in Shakespeare.
Prerequisites: 3 credits of literature at the 300-level; junior or senior classification.

ENGL 414 Milton
Credits 3. 3 Lecture Hours.
In-depth study of poetry and selected prose works of John Milton.
Prerequisite: 3 credits of literature at the 300-level; junior or senior classification.

ENGL 415 Studies in a Major Author
Credits 3. 3 Lecture Hours.
Exploration of a major author as a vehicle for emphasizing intensive analysis, scholarship and literary criticism.
Prerequisite: 3 credits of literature at 300-level; junior or senior classification.

ENGL 431 Chaucer
Credits 3. 3 Lecture Hours.
Intensive analysis of Chaucer’s works in Middle English, including engagement with published criticism and scholarship.
Prerequisite: 3 credits of literature at 300-level; junior or senior classification.

ENGL 460 Writing for the Web
Credits 3. 3 Lecture Hours.
Integration of technology instruction and proven technical communication strategies for developing effective audience-appropriate websites (infrastructure, structure, content, design, and navigation); focus on rhetorical shifts of the Internet medium, as well as ethical, sociocultural and legal issues, including web accessibility.
Prerequisites: ENGL 210; junior or senior classification.

ENGL 461 Advanced Syntax and Rhetoric
Credits 3. 3 Lecture Hours.
Points of view toward language study; traditional syntax; points of view toward rhetoric; Christensen’s rhetoric of the paragraph; analysis of written discourse.
Prerequisite: Senior classification or approval of instructor.

ENGL 462 Rhetoric in Cultural Context
Credits 3. 3 Lecture Hours.
Theories concerning the influence of socio-cultural context on expressive forms and how such forms are used to achieve social and communicative aims; analysis of examples of written, verbal, and visual rhetorics from various cultures illustrating the impact that expressive forms have on social life.
Prerequisites: ENGL 353, ENGL 354, or ENGL 355; junior or senior classification.

ENGL 474/WGST 474 Studies in Women Writers
Credits 3. 3 Lecture Hours.
A different topic each term examining women’s writing through historical period, genre, cross-cultural study and/or feminist literary theory. May be repeated for credit.
Prerequisites: 3 credits of literature at the 300-level; junior or senior classification.
Cross Listing: WGST 474/ENGL 474.

ENGL 481 Senior Seminar
Credits 3. 3 Lecture Hours.
Capstone seminar on significant figures, movements or issues with special attention to methods and materials of scholarship.
Prerequisites: ENGL 303; senior classification.

ENGL 484 Internship
Credits 3. 3 Lecture Hours.
Directed internship in a public or private organization to provide students with on-the-job training and applied research experience appropriate to career objectives. Must be taken satisfactory/unsatisfactory.
Prerequisites: Approval of department head; junior or senior classification.

ENGL 485 Directed Studies
Credits 0 to 3. 0 to 3 Other Hours.
Readings selected for specific need of major or minor in English.

ENGL 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of English language and literature. May be repeated for credit.

ENGL 491 Research
Credits 0 to 3. 0 to 3 Lecture Hours.
Research conducted under the direction of faculty member in English. May be repeated 2 times for credit.
Prerequisites: 12 credits of English, including 3 at 300-level; junior or senior classification and approval of instructor.
ENGL 497 Independent Honors Studies
Credits 1 to 3. 1 to 3 Other Hours.
Directed independent studies in the English language and English or American literature.
Prerequisites: Junior or senior classification either as Honors student or with overall GPR of 3.5 and letter of approval from head of student’s major department. May be repeated for credit.

ENGL 602 First Year Seminar
Credits 3. 3 Lecture Hours.
Comprehensive introduction to theory, method, and practice of graduate scholarship in English; develops familiarity with goals and practices of English studies, enhances research skills, formulates and articulates scholarship goals and projects, and practice writing genres within the field.
Prerequisite: Enrollment as a first-year PhD student.

ENGL 603 Bibliography and Literary Research
Credits 3. 3 Lecture Hours.
Introduction of basic techniques of research and scholarly procedure in literature; research reports.

ENGL 604 Topics in Digital Research
Credits 3. 3 Lecture Hours.
Topics in the studies of digital humanities; introduction to making/interpreting digital materials, the surrogates of books, paintings, etc.; that form our cultural heritage, as well as digitally-born literature and culture; reflection on digital cultures/digital archives; theory and practice of creating and researching digital resources. May be taken three times for credit.
Prerequisite: Graduate classification.

ENGL 607 Topics in Medieval Literature and Culture
Credits 3. 3 Lecture Hours.
Topics in history, theory, and interpretation of Medieval literature and culture; may cover Old or Middle English; may include study of varied cultural forms, manuscript or editing problems, genres, and themes. May be taken three times for credit as content varies.

ENGL 608 Readings in Medieval Literature
Credits 3. 3 Lecture Hours.
Wide reading in English literature of the Medieval period; introduction of major figures, genres, and issues in the period; introduction to current critical conversations in Medieval literary studies.

ENGL 610/LING 610 Topics in the History of the English Language
Credits 3. 3 Lecture Hours.
Topics in the development of the English language; may include phonological, grammatical and lexical histories; study of social and political contexts; relationships between English and other languages. Cross Listing: LING 610/ENGL 610. May be taken three times for credit as content varies.

ENGL 611 Topics in Early Modern Literature and Culture
Credits 3. 3 Lecture Hours.
Topics in the history, theory, interpretation of Early Modern literature and culture; may focus on authors, groups of authors, themes, movements, genres, cultural contexts and/or theoretical framing. May be taken three times for credit as content varies.

ENGL 613 Readings in Early Modern Literature
Credits 3. 3 Lecture Hours.
Wide reading in English literature of the Early Modern period; introduction of major figures, genres, and issues in the period; introduction to current critical conversations in Early Modern literary studies, including historical and social contexts.

ENGL 618 Readings in Eighteenth-Century British Literature
Credits 3. 3 Lecture Hours.
Wide reading in British literature of the 18th Century; introduction of major figures, genres, and issues in the period; introduction to current critical conversations in 18th Century literary studies, including historical and social contexts.

ENGL 622 Elements of Creative Writing
Credits 3. 3 Lecture Hours.
Creative writing in major forms; produce original work while reading models by masters; may include performance, group work, written and peer critiques.

ENGL 623 Topics in Creative Writing
Credits 3. 3 Lecture Hours.
Topics in the theory and practice of creative writing; may focus on writing techniques; theories of composition in the major genres; theory, history, and interpretation of literary forms and composition. May be taken three times for credit as content varies.

ENGL 624 Advanced Creative Writing Workshop
Credits 3. 3 Lecture Hours.
Writing workshop, with peer critique; may include discussion of literary and critical texts; major genres. May be taken three times for credit as instructor varies.
Prerequisite: ENGL 622 or approval of instructor.

ENGL 634 Readings in Nineteenth-Century British Literature
Credits 3. 3 Lecture Hours.
Wide reading in British literature of the 19th Century; introduction of major figures, genres, and issues in the period; introduction to current critical conversations in 19th Century literary studies, including historical and social contexts.

ENGL 638 Topics in 18th and 19th Century British Literature and Culture
Credits 3. 3 Lecture Hours.
Topics in the history, theory, interpretation of 18th and/or 19th Century British literature and culture; may focus on authors, groups of authors, themes, movements, genres, cultural contexts and/or theoretical framing. May be taken three times for credit as content varies.

ENGL 640 Topics in Children's Literature and Culture
Credits 3. 3 Lecture Hours.
Topics in the history, theory, and interpretation of children's literature and other cultural forms; may focus on genres, critical and theoretical methods, social and historical contexts. May be taken three times for credit as content varies.

ENGL 642 Topics in Genre
Credits 3. 3 Lecture Hours.
Topics in selected genres and subgenres of literary and cultural production; may focus on historical development and/or context, generic conventions, theoretical approaches. May be taken three times for credit as content varies.

ENGL 645 Topics in Gender, Literature, and Culture
Credits 3. 3 Lecture Hours.
Topics in literature (especially women’s writing), culture, and gender; may include issues such as feminism, masculinities, race, and sexualities; may be taken up to three times for credit.
ENGL 650 Readings in 20th and 21st Century Literature and Culture
Credits 3.3 Lecture Hours.
Wide reading in 20th and 21st Century literature; introduction of major figures, genres, and issues in the period; introduction to current critical conversations in modern and postmodern literary studies, including historical and social contexts.

ENGL 653 Topics in 20th and 21st Century Literature and Culture
Credits 3.3 Lecture Hours.
Topics in the history, theory, interpretation of 20th and 21st Century literature and culture; may focus on authors, groups of authors, themes, movements, genres, cultural contexts and/or theoretical framing. May be taken three times for credit as content varies.

ENGL 654/COMM 654 Classical Rhetoric
Credits 3.3 Lecture Hours.
Origins of rhetoric in classical Greece and Rome; exploration of the relationship between philosophy, rhetoric and democratic political culture; the contemporary relevance of classical thought to contemporary problems.
Cross Listing: COMM 654/ENGL 654.

ENGL 655/COMM 655 Contemporary Theories of Rhetoric
Credits 3.3 Lecture Hours.
Investigation of the major figures in rhetorical theory in the 20th and 21st centuries; analysis of the relationship between rhetoric and power; identifying new challenges for rhetoric in global, multicultural, technological age.
Cross Listing: COMM 655/ENGL 655.

ENGL 658 Topics in Film History
Credits 3.3 Lecture Hours.
Topics in the history of the production, reception, and institutional contexts of cinema; may focus on national cinemas, genres, movements, styles, film industries, film's relation to other media. May be taken three times for credit as content varies.

ENGL 659 Topics in Film Theory
Credits 3.3 Lecture Hours.
Topics in theory of film production, reception, and interpretation; may focus on film's relation to other media, on film theory's relation to other theoretical areas, on the interdisciplinary nature of film theory and film studies. May be taken three times for credit as content varies.

ENGL 665 Topics in Cultural/Interdisciplinary Studies
Credits 3.3 Lecture Hours.
Topics in history, theory, and practice of cultural studies and/or interdisciplinary studies; may focus on authors, schools, methods, genres, themes, or problems in rhetoric, discourse, and cultural studies. May be taken three times for credit as content varies.

ENGL 666 Topics in Textual Studies and Book History
Credits 3.3 Lecture Hours.
Topics in the theory and practice of textual studies and book history; may focus on the book as material object, histories of printing and other technologies, digital humanities, book production and distribution, research methodologies. May be taken three times for credit as content varies.

ENGL 667 Topics in the History and Theory of Rhetoric
Credits 3.3 Lecture Hours.
Issues and topics in the history and theory of rhetoric; may focus on rhetorical analysis of literature and other written and oral texts; theoretical issues in rhetoric and culture; social and historical contexts for rhetorical analysis; historical periods, themes, methods or genres. May be taken three times for credit as content varies.

ENGL 669 Topics in African American and Africana Literature and Culture
Credits 3.3 Lecture Hours.
Topics in the history, theory, interpretation of African American and African literature and culture; may focus on authors, groups of authors, themes, movements, genres, cultural contexts and/or theoretical framing. May be taken three times for credit as content varies.

ENGL 670 Topics in Latino/a Literature and Culture
Credits 3.3 Lecture Hours.
Topics in the history, theory, interpretation of Latino/a literature and culture; may focus on authors, groups of authors, themes, movements, genres, cultural contexts and/or theoretical framing. May be taken three times for credit as content varies.

ENGL 671 Readings in American Literature to 1900
Credits 3.3 Lecture Hours.
Wide reading in American literature from its beginnings through the 19th Century; introduction of major figures, genres, and issues in the period; introduction to current critical conversations in pre-1900 American literary studies, including historical and social contexts.

ENGL 672 Topics in American Literature and Culture to 1900
Credits 3.3 Lecture Hours.
Topics in the history, theory, interpretation of American literature and culture before 1900; may focus on authors, groups of authors, themes, movements, genres, cultural contexts and/or theoretical framing. May be taken three times for credit as content varies.

ENGL 673 Topics in Transnational Literature and Culture
Credits 3.3 Lecture Hours.
Topics in theory and interpretation of transnational literature and culture; may focus on definitions of the transnational; on the relationships between the transnational and the global; on methods for study; on new configurations of literature and culture. May be taken three times for credit as content varies.

ENGL 680/WGST 680 Theories of Gender
Credits 3.3 Lecture Hours.
Theories of gender, sexualities, feminism, embodiment, and difference with particular focus on their relationship to literary and cultural studies; emphasis on contemporary theoretical positions, discourses, and debates.
Cross Listing: WGST 680/ENGL 680.

ENGL 681 Seminar in English
Credit 1.1 Lecture Hour.
Presentations by faculty, students and visiting scholars based on current research. May be repeated for credit.
Prerequisite: Graduate classification in English.

ENGL 683 Topics in Theory
Credits 3.3 Lecture Hours.
Critical theory for English Studies; may focus on history, themes, methods, issues, new developments, interdisciplinary contexts. May be taken three times for credit as content varies.

ENGL 685 Directed Studies
Credits 1 to 6.1 to 6 Other Hours.
Readings to supplement the student's knowledge of English or American literature or of the English language in areas not studied in other courses; research papers.
Prerequisites: Graduate classification and approval of department head.

ENGL 689 Special Topics in...
Credits 1 to 4.1 to 4 Lecture Hours.
Selected topics in an identified area of English. May be repeated for credit.
ENGL 691 Research  
Credits 1 to 23. 1 to 23 Other Hours.  
Research for thesis or dissertation.  

ENGL 695 Publication and Professionalization  
Credits 3. 3 Lecture Hours.  
For advanced PhD students in English. Discussion of publication and professionalization; standards and practices of publication in academic journals; academic job market; writing, revision, and submission of scholarly articles. To be taken as S/U only.  
Prerequisite: Must have completed coursework in English.  

ENGL 697 Pedagogy  
Credits 3. 3 Other Hours.  
Theories of teaching literature, composition, or rhetoric; pedagogical approaches and methods; supervised teaching; evaluation of current research and its relation to pedagogical practice; designed to assist students in their first teaching experience.  

ENGR - Engineering  

Courses  

ENGR 101 Energy: Resources, Utilization and Importance to Society  
Credits 4. 3 Lecture Hours. 2 Lab Hours.  
Introductory course about current and potential energy sources, the link between energy and wealth, and the consequences of action or inaction concerning energy and the environment.  

ENGR 111 Foundations of Engineering I  
Credits 2. 1 Lecture Hour. 3 Lab Hours.  
Introduction to the engineering profession, ethics, and disciplines; development of skills in teamwork, problem solving and design; other topics included, depending on the major, are: emphasis on computer applications and programming, visualization and CAD tools, introduction to electrical circuits, semiconductor devices, digital logic, communications and their application in systems; Newton's laws, unit conversions, statistics, computers, Excel; basic graphics skills; visualization and orthographic drawings.  
Corequisite: MATH 151; admission to Dwight Look College of Engineering.  

ENGR 112 Foundations of Engineering II  
Credits 2. 1 Lecture Hour. 3 Lab Hours.  
Continuation of ENGR 111. Topics include, depending on the major: emphasis on computer applications and programming and solids modeling using CAD tools or other software; fundamentals of engineering science; advanced graphic skills.  
Prerequisite: ENGR 111, MATH 151.  

ENGR 181 Engineering Honors Seminar I  
Credit 1. 1 Lecture Hour.  
Survey of interdisciplinary topics related to the professional practice of engineering; seminars with practicing professionals in industry and government. Must be taken on a satisfactory/unsatisfactory basis.  
Prerequisites: Certificate in engineering honors membership; freshman or sophomore classification.  

ENGR 270 Engineering Projects in Community Service  
Credit 1. 1 Lecture Hour.  
Project course using team approach to engage students in open-ended community service projects involving non-profit agencies; includes project management, understanding the complete design process, awareness of the customer in engineering design, and the ability to communicate effectively. May be taken six times for credit.  
Prerequisites: ENGR 111 or approval of instructor; freshman or sophomore classification in an engineering major.  

ENGR 281 Engineering Honors Seminar II  
Credit 1. 1 Lecture Hour.  
Introduction to research and development in both university and industry settings. Must be taken on a satisfactory/unsatisfactory basis.  
Prerequisites: Certificate in engineering honors membership; ENGR 181.  

ENGR 285 Directed Studies  
Credits 0 to 4. 0 to 4 Other Hours.  
Special problems in any area of engineering.  
Prerequisites: Freshman or sophomore classification; approval of department head.  

ENGR 289 Special Topics in...  
Credits 0 to 4. 0 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified area of engineering. May be repeated for credit.  
Prerequisite: Approval of instructor.  

ENGR 291 Research  
Credits 1 to 4. 1 to 4 Other Hours.  
Research conducted under the direction of faculty member in the college of engineering. May be taken four times for credit.  
Prerequisites: Freshman or sophomore classification and approval of instructor.  

ENGR 301 College of Engineering Study Abroad  
Credits 0 to 18. 0 to 18 Other Hours.  
For students in approved programs abroad. May be repeated for credit.  
Prerequisites: Admission to approved program; approval of study abroad coordinator.  

ENGR 302 STUDY ABROAD AT TAMU QATAR  
Credits 0.  

ENGR 381 Engineering Honors Seminar III  
Credit 1. 1 Lecture Hour.  
Exploration of research and development opportunities; university and industry research; research commercialization. To be taken on a satisfactory/unsatisfactory basis.  
Prerequisite: Certificate in engineering honors membership; ENGR 281.  

ENGR 385 Problems for Co-Op Students  
Credits 1 to 3. 1 to 3 Other Hours.  
Special problems in engineering for cooperative education students. Problems related to student's work assignment culminating in a research paper. Three hours may be used as technical elective, and one additional hour may be used as free elective. A total of 4 hours may be used toward graduation.  
Prerequisite: Approval of department head.
ENGR 401 Interdisciplinary Design  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Instruction and practice in the following design process applied to an interdisciplinary design project: establish the customer need; determine requirements in terms of function (what) and performance (how well); develop alternative design concepts; perform trade-off studies among performance, cost and schedule; embodiment and detail design; iterate the above steps; major interdisciplinary design project.  
Prerequisites: Senior classification and approval of instructor.

ENGR 402 Interdisciplinary Design II  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Product detail and design development process including case studies; may include project management, marketing considerations, manufacturing detailed design specifications; failure modes, applications of codes and standards, selection of design margins; product (component) development guidelines; intellectual property, product liability and ethical responsibility.  
Prerequisites: ENGR 401; junior or senior classification.

ENGR 410 Global Engineering Design  
Credits 0 to 3. 0 to 3 Lecture Hours.  
Intercultural models and their application to engineering design in diverse, multinational and multidisciplinary settings; engineering design project working in international teams of students, faculty and industry experts; applying engineering skills to the project; includes the study and application of intercultural models, global enterprise fundamentals and remote collaboration technologies; required for the International Engineering Certificate.  
Prerequisite: Junior or senior classification or approval of instructor.

ENGR 470 Engineering Projects in Community Service  
Credits 1 to 2. 1 to 2 Other Hours.  
Project course using team approach to engage students in open-ended community service projects involving non-profit agencies; includes project management, understanding the complete design process, awareness of the customer in engineering design, and the ability to communicate effectively. May be taken six times for credit.  
Prerequisites: ENGR 111 or approval of instructor; junior or senior classification in an engineering major.

ENGR 482/PHIL 482 Ethics and Engineering  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Development of techniques of moral analysis and their application to ethical problems encountered by engineers, such as professional employee rights and whistle blowing; environmental issues; ethical aspects of safety, risk and liability and conflicts of interest; emphasis on developing the capacity for independent ethical analysis of real and hypothetical cases.  
Prerequisite: Junior classification.  
Cross Listing: PHIL 482/ENGR 482.

ENGR 484 International Engineering Internship  
Credits 0 to 6. 0 to 6 Lecture Hours.  
International Engineering Internship.  
Prerequisite: Junior or senior classification.

ENGR 485 Directed Studies  
Credits 0 to 4. 0 to 4 Other Hours.  
Directed individual study of problems in any area of engineering. May be taken 3 times for credit.  
Prerequisites: Junior or senior classification; approval of the college.

ENGR 489 Special Topics in...  
Credits 0 to 4. 0 to 4 Lecture Hours. 0 to 6 Lab Hours.  
Selected topics in an identified field of engineering. May be repeated for credit.

ENGR 491 Research  
Credits 1 to 4. 1 to 4 Other Hours.  
Research conducted under the direction of faculty member in the College of Engineering. May be repeated 3 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.  
Prerequisites: Junior or senior classification and approval of instructor.

ENGR 600 Engineering Graduate Study Abroad  
Credits 1 to 15. 1 to 15 Lecture Hours.  
For students in approved study abroad and reciprocal educational exchange programs. May be taken two times for credit.  
Prerequisites: Graduate classification in engineering; admission to approved program abroad; approval of study abroad coordinator.

ENGR 677 Science, Technology, Engineering and Mathematics (STEM) Teaching Professional Development  
Credit 1. 1 Lecture Hour.  
Center for Teaching Excellence (CTE) consultation and faculty mentoring in STEM teaching; course topic and syllabus design; learning outcomes and assessment; teaching methodology; reflection on teaching philosophy; reflection on teaching as research. Must be taken on satisfactory/unsatisfactory basis.  
Prerequisites: Graduate classification and approval of instructor.  
Cross Listing: GEOS 677 and SCEN 677.

ENGR 681 Professional Development Seminar  
Credit 1. 1 Other Hour.  
Topics of interest related to the professional practice of engineering.

ENGR 684 Professional Internship  
Credits 1 to 10. 1 to 10 Other Hours.  
Supervised experience of one academic year in industry where students can learn to apply their textbook-based skills to problems in the real-world environment.  
Prerequisites: Admission to the Doctor of Engineering program and graduate classification.

ENGR 685 Directed Studies  
Credits 1 to 6. 1 to 6 Other Hours.  
Design or research problems executed either individually or as a team.  
Prerequisites: Graduate classification; approval of graduate advisor.

ENGR 689 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Advanced topics of current interest in engineering. May be repeated for credit.  
Prerequisite: Approval of instructor.

ENGR 698 Writing for Publication  
Credits 3. 3 Lecture Hours.  
(3-0) Writing in academic disciplines and settings. Writing for different audiences and purposes. Style; planning and development of academic journal articles; grant proposals; correspondence; oral presentations; technical reports. Permission of departmental/college graduate advisor.  
Prerequisite: advanced standing in master's/doctoral programs.
Courses

ENST 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in environmental studies. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

ENST 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in environmental studies. May be repeated 3 times for credit. Registration in multiple sections of this course are possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Freshman or sophomore classification and approval of instructor.

ENTO - Entomology

Courses

ENTO 201 General Entomology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Survey of the major classes of arthropods with special emphasis on species of economic or biological importance; general insect anatomy, physiology, metamorphosis and classification; survey of the biology of insect orders and major families using common injurious and beneficial species to relate material to production agriculture and the urban environment.

ENTO 208 Veterinary Entomology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Classification, biology and control of insects and other arthropods associated with livestock and poultry production; identification emphasized in laboratory.

ENTO 210 Global Public Health Entomology
Credits 3. 3 Lecture Hours.
Impacts of insects and insect-borne diseases on public health and well-being around the globe; insect biology, bloodfeeding, and transmission of human diseases; role of insect borne diseases on human history, socio-economic development, and public health infrastructure.
Prerequisite: Freshman or sophomore classification or approval of instructor.

ENTO 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed individual study in entomology.
Prerequisites: Freshman or sophomore classification; approval of instructor and department head.

ENTO 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
I, II, S Selected topics in an identified area of entomology. May be repeated for credit.
Prerequisite: Approval of instructor.

ENTO 481 Seminar
Credit 1. 1 Lecture Hour.
Presentation of selected topics from current literature and related industrial operations in various technical areas; films showing practical application of manufacturing and industrial processes; lectures from industrial representatives.
Prerequisite: Senior classification.

ENTO 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Permits work in a special problem area on an individual basis with the intent of promoting independent reading, research and study; to supplement existing course offerings or subjects not presently covered.
Prerequisites: Senior classification and approval of instructor.

ENTO 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of entomology. May be repeated for credit.
Prerequisite: Approval of instructor.

ENTO 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in the college of engineering. May be taken three times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor.

ENTO 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of engineering technology. May be repeated for credit.

ENTC - Engineering Technology

Courses

ENTC 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
I, II, S Selected topics in an identified area of engineering technology. May be repeated for credit.
Prerequisite: Approval of instructor.

ENTC 481 Seminar
Credit 1. 1 Lecture Hour.
Presentation of selected topics from current literature and related industrial operations in various technical areas; films showing practical application of manufacturing and industrial processes; lectures from industrial representatives.
Prerequisite: Senior classification.

ENTC 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Permits work in a special problem area on an individual basis with the intent of promoting independent reading, research and study; to supplement existing course offerings or subjects not presently covered.
Prerequisites: Senior classification and approval of instructor.

ENTC 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of engineering technology. May be repeated for credit.
Prerequisite: Approval of instructor.

ENTC 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in engineering technology. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

ENTC 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of engineering technology. May be repeated for credit.

ENTC 300/WFSC 300 Field Studies
Credits 3. 3 Other Hours.
Integration of principles of animal and plant ecology with environmental factors to characterize wildlife populations. Intensive analysis of specific areas will emphasize either the development of a wildlife management plan or a general vertebrate natural history survey.
Prerequisite: Junior or senior classification.
Cross Listing: WFSC 300/ENTO 300.

ENTC 301 Biodiversity and Biology of Insects
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Introduction to orders and most important families of insects; order-level morphology and family-level natural history; collection of insects identified to family level provides introduction to collection methods and specimen preparation.
Prerequisites: ENTO 201 or ENTO 208; 6 hours of biological sciences; junior or senior classification or approval of instructor.

ENTC 305 Evolution of Insect Structure
Credits 3. 2 Lecture Hours. 3 Lab Hours.
External morphology of insects; evolution of form and function.
Prerequisite: 6 hours of biological sciences.
ENTO 306 Insect Physiology
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Physiology of insects; structure and function of internal organ systems and their role in insect success.
Prerequisite: ENTO 201 or ENTO 208; BIOL 111 and BIOL 112; CHEM 101/CHM 111 and CHEM 102/CHM 112.

ENTO 313 Biology of Insects
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Study of the orders and important families of insects and related arthropods, including general biology, relationships with plants and other animals, and characteristics used in identification.
Prerequisite: 3 hours of biological science.

ENTO 315 Biotechnology and Society
Credits 3. 3 Lecture Hours.
Understanding the technology and principles of biotechnology; interpreting and communicating biotechnology reports of both popular press and peer-reviewed scientific articles.
Prerequisite: Junior or senior classification or approval of instructor.

ENTO 320 Honey Bee Biology
Credits 3. 3 Lecture Hours.
Introduction of honey bee biology and beekeeping practices to science and non-science majors; honey bees as the model insect to introduce general principles of biology and entomology.
Prerequisite: Junior or senior classification or approval of instructor.

ENTO 322 Insects and Human Society
Credits 3. 3 Lecture Hours.
Emphasis on the role insects have played in the development of human cultures; aspects include health, food production and storage, art, music and architecture; overview of historic, present day, and future roles insects will have on environmental movements (green societies), and in underdeveloped, developing and developed societies.
Prerequisite: Junior or senior classification.

ENTO 401 Principles of Integrated Pest Management
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Integrated pest management (IPM) concepts, principles, development and application; IPM constitutes a series of pest control tactics and strategies toward more sustainable agriculture, natural resources, and urban and rural health and well-being.
Prerequisite: ENTO 201 or ENTO 208.

ENTO 402 Field-Crop Insects
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Application of management strategies for insect/mite pests of small grains, corn, cotton, rice, sorghum, stored products and sunflower; nature and symptoms of damage, life history and habits of common pests. Laboratory consists of pest and pest damage identification supported by field trips.
Prerequisite: ENTO 201 or equivalent.

ENTO 403 Urban Entomology
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Biological, economic importance and control strategies for arthropod pests commonly invading households and commercial structures in urban environments; laboratory consists of urban pest identification and special presentations and demonstrations covering topics related to urban pest problems and their control. Offered in 2011-2012 academic year and alternating years thereafter.
Prerequisite: ENTO 201 or equivalent or approval of instructor.

ENTO 423 Medical Entomology
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Biology, disease relationships, and control of insects and other arthropods parasitic on or in humans; aspect of the fields of clinical and preventative medicine; survey, collection and taxonomy of medically-important arthropods in laboratory sessions.
Prerequisite: Junior or senior classification or approval of instructor.

ENTO 424 Insect Ecology
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Provides basic ecological background with an applied interpretation, emphasizing influences of insect populations and communities on ecosystem processes that influence landscape structure, function and change.
Prerequisites: ENTO 201 or equivalent; 3 hours of biological sciences; junior or senior classification or approval of instructor.

ENTO 425 Disease Ecology
Credits 3. 3 Lecture Hours.
Ecological interactions that influence the distribution and abundance of pathogens, vectors, and hosts ultimately determine the spread of disease; impacts of urbanization, climate change, and other human influenced environmental changes on disease dynamics; integration of disease ecology into pathogen and vector monitoring and comprehensive strategies to reduce disease occurrence.
Prerequisite: Junior or senior classification, or approval of instructor.

ENTO 428 Insect Biotechnology
Credits 3. 3 Lecture Hours.
Applications of genetic engineering and biotechnology; specific problems dealing with insects and control of insect pests.
Prerequisites: GENE 301 or GENE 315 or GENE 320/BIMS 320; junior or senior classification or approval of instructor.

ENTO 429 Insect Biotechnology Laboratory
Credit 1. 3 Lab Hours.
Basic technical experience in insect molecular biology and biotechnology, including genomic DNA isolation, PCR, cloning, sequencing and gene manipulation techniques; focus on insect applications for improvement of human health and agriculture.
Prerequisites: ENTO 428; concurrent enrollment in ENTO 428; junior or senior classification or approval of instructor.

ENTO 431/FIVS 431 The Science of Forensic Entomology
Credits 3. 3 Lecture Hours.
Explores the science, methodology and technology employed to gather, preserve and present information about insects and other arthropods in such a manner that this information can be used in courts of law as evidence and testimony to help resolve issues of a criminal or civil nature.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: FIVS 431/ENTO 431.

ENTO 432/FIVS 432 Applied Forensic Entomology
Credit 1. 3 Lab Hours.
Laboratory-based course offering practical experience using scientific information, methodology, technology, and legal procedures inherent to the field of forensic entomology; emphasis on collecting, preserving, and identifying information as evidence and expert witness testimony in courts of law.
Prerequisites: Concurrent enrollment in ENTO 431/FIVS 431; junior or senior classification or approval of instructor.
Cross Listing: FIVS 432/ENTO 432.
ENTO 435 Case Studies in Problem Solving  
**Credits 3. 3 Lecture Hours.**  
Development of reasoning strategies by examining a variety of case studies, science and scientific methods; solving real-world problems as part of an investigative team.  
**Prerequisite:** Senior classification or approval of instructor.

ENTO 450/WFSC 450 Caribbean Conservation  
**Credits 2. 6 Lab Hours.**  
Provide experience in and appreciation for diverse tropical habitats and the problems associated with conserving these habitats; design and conduct individual research projects on topics of their choice with approval from the instructors on project design and feasibility.  
**Prerequisites:** Concurrent enrollment in ENTO 300/WFSC 300 and ENTO 451/WFSC 451; junior or senior classification.  
**Cross Listing:** WFSC 450/ENTO 450.

ENTO 451/WFSC 451 Caribbean Research Seminar  
**Credit 1. 1 Other Hour.**  
Document research activities; keep a journal of activities and research methods during study abroad trips.  
**Prerequisites:** Concurrent enrollment in ENTO 300 and 450; junior or senior classification.  
**Cross Listing:** WFSC 451/ENTO 451.

ENTO 481 Seminar  
**Credit 1. 1 Lecture Hour.**  
Report of original investigations, current literature and special features of entomology.  
**Prerequisites:** ENTO 201 or equivalent; junior or senior classification.

ENTO 482 Occupational and Professional Development  
**Credits 2. 2 Lecture Hours.**  
Organized instruction in written and oral communication; acquaint students with private and public-sector companies and agencies as well as leading professionals from these firms to reinforce academic instruction and prepare students for the transition to employment, graduate and professional schools.  
**Prerequisite:** ENTO 201 or ENTO 208; or approval of instructor.

ENTO 484 Professional Internship  
**Credits 1 to 4. 1 to 4 Other Hours.**  
Independent study and supervised field experience related to a professional area of interest in entomology. May be taken two times for credit.  
**Prerequisite:** Junior or senior classification or approval of instructor.

ENTO 485 Directed Studies  
**Credits 1 to 4. 1 to 4 Other Hours.**  
Individual problems.  
**Prerequisites:** ENTO 201 or equivalent; junior or senior classification; approval of instructor and department head.

ENTO 489 Special Topics in...  
**Credits 1 to 4. 0 to 4 Lecture Hours. 0 to 4 Lab Hours.**  
Selected topics in an identified area of entomology. May be repeated for credit.  
**Prerequisite:** Approval of instructor.

ENTO 491 Research  
**Credits 1 to 4. 1 to 4 Other Hours.**  
Faculty supervised research in entomology. May be taken two times for credit. Registration in multiple sections of this course are possible within a given semester provided that the per semester credit hour limit is not exceeded.  
**Prerequisites:** Junior or senior classification or approval of instructor.

ENTO 601 Principles of Systematic Entomology  
**Credits 3. 3 Lecture Hours.**  
An introduction to the principles and theory of systematic zoology and comparative biology including species concepts and speciation; methods for higher classification including phylogenetic systematics, phenetics and evolutionary taxonomy; introduction to zoological nomenclature.  
**Prerequisite:** Graduate classification in entomology or other biological sciences.

ENTO 602 Insect Biodiversity and Biology  
**Credits 4. 3 Lecture Hours. 3 Lab Hours.**  
Biodiversity and biology of the orders and selected families of insects; order-level morphology, family-level natural history and identification; field trips and an insect collection provide experience with insect collecting methods, specimen preparation techniques and field biology.  
**Prerequisite:** 6 hours of biological sciences.

ENTO 606 Quantitative Phylogenetics  
**Credits 3. 2 Lecture Hours. 3 Lab Hours.**  
Designed to provide the theory and tools required for inference of phylogenetic (evolutionary) relationships among biological taxa using various types of comparative data including morphological characters, biochemical and molecular characters, and DNA sequences; hands-on analysis of data using contemporary tools.  
**Prerequisite:** Entomology 601 or approval of instructor.  
**Cross Listing:** GENE 606 and WFSC 646.

ENTO 608 Principles of Biological Control  
**Credits 3. 3 Lecture Hours.**  
Theory and practices relating to the role and use of natural enemies in arthropod and plant population regulation; review and analysis of projects in biological control; biology and behavior of entomophagous arthropods.  
**Prerequisite:** ENTO 201 or equivalent or approval of instructor.

ENTO 610 Host Plant Resistance  
**Credits 3. 3 Lecture Hours.**  
Host plant resistance programs from the standpoint of the plant breeder, plant pathologist and entomologist; team taught with each discipline represented; roundtable discussion of assigned readings and lectures.  
**Prerequisite:** Approval of instructor.  
**Cross Listing:** SCSC 610 and PLPA 610.

ENTO 612 Insect Evolution  
**Credits 3. 3 Lecture Hours.**  
Review current and historical ideas about the phylogeny and evolution of the major groups of hexapods; includes evidential basis for hypotheses of monophyly, competing phylogenetic hypotheses, major innovations and trends affecting the adaptive radiations of specific taxa, morphological character systems, and history of insect classification and the major character systems.  
**Prerequisite:** One semester of insect or invertebrate zoology.

ENTO 614 Insect Community Ecology  
**Credits 3. 3 Lecture Hours.**  
Provide a strong and contemporary foundation in insect population, community and evolutionary ecology; review historical and theoretical perspectives, current philosophies, approaches and a description of classic experiments used to test and modify theories on topics including: insect herbivore-plant interactions; major biological forces affecting population dynamics and community structure (resource availability, competition, predation, mutualisms, etc.).  
**Prerequisite:** Graduate classification.
ENTO 615 Insect Physiology
Credits 3. 3 Lecture Hours.
Physiological processes of insects; metabolism, nutrition, neuro-endocrinology, nerve action, cell structure, respiration, circulation, excretion and flight; functional integration and regulatory processes of total organism.
Prerequisite: ENTO 306 or equivalent.

ENTO 617 Acarology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Systematics, morphology, physiology, and ecology of ticks and mites; management of acarine pests of humans, animals and plants; role of parasitic species in causation and transmission of diseases.
Prerequisite: ENTO 208 or equivalent. (Offered in 2010-2011 and alternate years thereafter.)

ENTO 618 Medical and Veterinary Entomology
Credits 4. 3 Lecture Hours.
Taxonomy, biology and epidemiological role of insects that directly and/or indirectly affect the health and well-being of humans and animals.
Prerequisite: ENTO 208 or equivalent. (Offered in 2010-2011 and alternate years thereafter.)

ENTO 619 Insect Toxicology
Credits 3. 3 Lecture Hours.
Classification and properties of major types of insecticides; chemistry, metabolism and mode of action; selectivity, use hazards, residues and resistance; environmental problems: biological magnification, persistence and effects on non-target organisms.
Prerequisites: One course in organic chemistry and ENTO 615 or approval of instructor.

ENTO 621 Biology and Systematics of Entomophagous Insects
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Systematics of entomophagous insects at the family level; collecting and rearing parasitoids from their hosts; emphasis on groups used in biological control.
Prerequisites: ENTO 301 or approval of instructor. (Offered in 2010-2011 and alternate years thereafter.)

ENTO 625/GEOG 625 Landscape Ecology
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Study of structure, function and change in a heterogeneous land area composed of interacting ecosystems; examine basic ecological principles dealing with landscape structure.
Prerequisite: Approval of instructor.
Cross Listing: GEOG 625/ENTO 625.

ENTO 628 Arthropod Genomes and Gene Expression
Credits 3. 3 Lecture Hours.
Introduction to the vocabulary and experimental procedures routinely used for molecular genetic studies using arthropod systems as model examples; discussion of germ-line transformation, transient gene expression, and the analysis of tissue-specific and genome-wide gene expression.
Prerequisite: GENE 301 or equivalent.

ENTO 645 Arthropods as Vectors of Plant Pathogens
Credits 3. 3 Lecture Hours.
Concepts on transmission of plant pathogens, discussion of transmission mechanisms, characteristics of insect vectors and their consequences for plant protection.
Prerequisites: Graduate classification or approval of instructor.

ENTO 681 Seminar
Credit 1. 1 Lecture Hour.
Oral reports and discussions of current research and developments in entomology and related fields; designed to broaden understanding of problems in field and to stimulate research.
Prerequisite: Graduate classification.

ENTO 684 Professional Internship
Credits 1 to 4. 1 to 4 Other Hours.
On-the-job training in the fields of pest identification, home and garden pest control, medical and veterinary pest control, and pest management of food and fiber crop pests.
Prerequisite: Graduate classification in the Master of Agriculture program in economic entomology or plant protection.

ENTO 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Entomological problems not pertaining to thesis or dissertation.
Prerequisites: Graduate classification with major or minor in entomology; approval of department head.

ENTO 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of entomology. May be repeated for credit.
Prerequisite: Graduate classification.

ENTO 690 Theory of Research
Credit 1. 1 Lecture Hour.
Examination of concepts and theories in entomological research including applications of novel technologies and experimental approach. May be repeated for credit.
Prerequisite: Graduate classification.

ENTO 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research problems on taxonomy, life histories, biological control, ecology and physiology of insects, and toxicology of insecticides.
Prerequisite: Graduate classification.

EPFB - Educ Psyc Field Based

Courses

EPFB 210 Family Involvement and Empowerment
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Field-based course that provides information and skills necessary to work with diverse families; addresses need for positive school-family collaboration and characteristics of families throughout the life cycle, the collaboration of educators with families through the special education process, and the provision of family services through community agencies.

EPFB 301 Teaching Skills I
Credits 3. 1 Lecture Hour. 6 Lab Hours.
Study and development of skills focusing on collaboration, instruction, classroom management and professionalism in P-12 schools; field experience in general education settings. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisite: Admission to professional phase of program.
EPFB 401 Teaching Skills II  
Credits 3. 1 Lecture Hour, 6 Lab Hours.  
Study and development of skills focusing on individual P-12 students’ needs with emphasis on delivering complete lessons from a written plan to include Texas Essential Knowledge and Skills (TEKS) and Individualized Educational Program (IEP) objectives, incorporating modifications appropriately, setting behavioral expectations, and using questioning strategies for high level thinking; field experience in two special education settings. Must be taken on a satisfactory/unsatisfactory basis.  
Prerequisite: Admission to professional phase of program.

EPFB 484 Field Experiences  
Credits 0 to 6. 0 to 6 Other Hours.  
University-supervised experience in a professional employment setting related to specializations in guidance and special education. May be repeated for credit up to 6 hours. Must be taken on a satisfactory/unsatisfactory basis.  
Prerequisites: Admission to program; junior or senior classification.

**EPSY - Educational Psychology**

**Courses**

EPSY 291 Research  
Credits 0 to 4. 0 to 4 Other Hours.  
Research conducted under the direction of faculty member in educational psychology. May be repeated 2 times for credit.  
Prerequisites: Freshman or sophomore classification and approval of instructor.

EPSY 320 Child Development  
Credits 3. 3 Lecture Hours.  
Growth and development of the normal child from infancy to adolescence; implications of children's cognitive, language and psychosocial development for success in academic and social interactions.  
Prerequisite: Junior or senior classification.

EPSY 321 Adolescent Development  
Credits 3. 3 Lecture Hours.  
Characteristics of adolescent growth and development emphasizing behavior within secondary school setting; influences of prior development; home, family and community; peer group, as these affect school adjustment and success.  
Prerequisite: Junior or senior classification.

EPSY 428 Collaboration in School Settings  
Credits 3. 3 Lecture Hours.  
Strategies and skills for providing collaborative services in school settings with emphasis on problem solving; coordinated team functioning and delivery of services at the individual classroom and school building levels.  
Prerequisites: Admission to professional phase of program.

EPSY 430 Creativity Theories and Research  
Credits 3. 3 Lecture Hours.  
Theoretical base of creativity and the research methodologies used to study creativity.  
Prerequisite: Junior or senior classification.

EPSY 431 Personal Creativity and Giftedness  
Credits 3. 3 Lecture Hours.  
Personal giftedness and creativity and its innerrelativity with development, relationships, and learning.  
Prerequisite: Junior or senior classification.

EPSY 432 Creativity and Creative Problem Solving  
Credits 3. 3 Lecture Hours.  
Creativity research; historical background and application of the framework and tools of the Parnes/Osborn Creative Problem Solving Process.  
Prerequisite: Junior or senior classification.

EPSY 433 Lateral Thinking  
Credits 3. 3 Lecture Hours.  
Edward deBono's theories and approach to creativity known as lateral thinking which is used throughout the world to increase creative thinking in individuals.  
Prerequisite: Junior or senior classification.

EPSY 435 Educational Statistics  
Credits 3. 3 Lecture Hours.  
Statistical concepts and techniques and their application in behavioral sciences.  
Prerequisite: Junior or senior classification.

EPSY 439 Practicum in Educating the Gifted and Talented  
Credits 3. 1 Lecture Hour, 6 Lab Hours.  
Theory and strategies for instruction and guidance of the gifted and talented through a supervised experience in a laboratory setting with gifted and talented children and/or adolescents. May be taken two times for credit.  
Prerequisites: Approval of department head and instructor; junior or senior classification.

EPSY 484 Field Experiences  
Credits 0 to 6. 0 to 6 Other Hours.  
University-supervised experience in a professional employment setting related to specializations in guidance and special education. May be repeated to 6 hours total.  
Prerequisites: Approval of student's advisor and department head.

EPSY 485 Directed Studies  
Credits 0 to 4. 0 to 4 Other Hours.  
Research problems and readings in areas selected to supplement existing offerings; individual reports, oral and written, required.  
Prerequisites: Junior or senior classification; approval of instructor.

EPSY 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of educational psychology. May be repeated for credit.  
Prerequisite: Approval of instructor.

EPSY 491 Research  
Credits 0 to 4. 0 to 4 Other Hours.  
Research conducted under the direction of faculty member in educational psychology. May be repeated 2 times for credit.  
Prerequisites: Junior or senior classification and approval of instructor.

EPSY 602 Educational Psychology  
Credits 3. 3 Lecture Hours.  
Cognitive analysis of academic skills and tests; current cognitive views of learning, memory, problem solving and development of skill and expertise; effects of aptitude, motivation and task environment on academic performance. Implications for assessment and instruction.  
Prerequisite: Approval of department head.

EPSY 604 Career Counseling in Schools  
Credits 3. 3 Lecture Hours.  
Understanding the culturally competent career counseling theory, assessment and skills as applied to the diverse populations in schools.  
Prerequisite: Approval of department head.
EPSY 605 Effects of Culture, Diversity, and Poverty on Children and Youth  
Credits 3.3 Lecture Hours.  
Understanding of how the intersecting nature of culture, diversity, and poverty impact adjustment outcomes in children and youth; comprehension of our own belief systems; exploration of disparities in education and mental health across ethnically, culturally and socially diverse groups; strategies for alleviating educational and mental health disparities.  
Prerequisite: Graduate classification.

EPSY 606 Motivation and Emotion for Optimal Learning and Performance  
Credits 3.3 Lecture Hours.  
Role of motivation and emotion in human learning and performance; major theories and empirical research relevant to motivation and emotional impacts of learning, performance, or functioning in a variety of situations, contexts, and cultures; content applied across multiple disciplines including education, counseling or therapeutic outcomes, achievement performance in school, art, music and sports.  
Prerequisite(s): EPSY 602 or approval of instructor; graduate classification.

EPSY 618 Neurodevelopment and Genetic Disorders in Children  
Credits 3.3 Lecture Hours.  
Comprehensive coverage of a broad array of neurodevelopment and genetic disorders in children; emphasis on cognitive and emotional sequelae of these disorders and their relationship to medical, psychological, and educational interventions.  
Prerequisite: Graduate classification; approval of department head.

EPSY 619 Nature and Needs of the Gifted and Talented  
Credits 3.3 Lecture Hours.  
Psychological characteristics of the gifted and talented; introduction to identification techniques, educational programs, instructional approaches and special problems.  
Prerequisite: Approval of department head.

EPSY 621 Clinical Neuropsychology  
Credits 3.2 Lecture Hours. 2 Lab Hours.  
Surveys brain-behavior relationships with an emphasis on understanding the brain as an interdependent, systemic network; administer and score the Halstead-Reitan Neuropsychological Test Battery.  
Prerequisite: Graduate classification; approval of department head.

EPSY 622 Measurement and Evaluation in Education  
Credits 3.3 Lecture Hours.  
Principles of psychological testing applied to education; uses and critical evaluation of achievement and aptitude, interest, and personality tests and performance in educational settings.  
Prerequisite: Approval of department head.

EPSY 623 Social and Emotional Development of the Gifted and Talented  
Credits 3.3 Lecture Hours.  
Theoretical models and patterns of social and emotional development among the gifted and talented through adolescence; implications and strategies for educators.  
Prerequisite: Approval of department head.

EPSY 624 Creative Thinking  
Credits 3.3 Lecture Hours.  
Development of personal creativity across fields of endeavor; analysis of creative potential, including psychometric assessment; experience of methods for stimulating creative processing and productivity.  
Prerequisite: Approval of department head.

EPSY 625 Advanced Psychometric Theory  
Credits 3.3 Lecture Hours.  
Psychometric theory, planning, construction, analysis, and evaluation of written and performance tests; item analysis, norms, reliability, and validity (including factor analytic) studies; item response theory.  
Prerequisites: EPSY 640; approval of department head.

EPSY 626 At-Risk Hispanic Families and Their Young Children  
Credits 3.3 Lecture Hours.  
Provides educational practitioners and related personnel with the conceptual and theoretical foundations for understanding the nature and impact of exposure to childhood risks on literacy, physical and mental health development of Hispanic families and their young children within developmental framework.  
Prerequisites: Graduate classification; approval of department head.

EPSY 627 Structured Personality Assessment in Counseling  
Credits 3.3 Lecture Hours.  
Personality evaluation using structured assessment instruments; variety of self-report personality inventories; the Minnesota Multiphasic Personality Inventory.  
Prerequisites: EPSY 622; approval of department head.

EPSY 628 The Rorschach Technique with Children and Adolescents  
Credits 3.3 Lecture Hours.  
Analysis of the Rorschach Technique; basic issues in projective assessment, scoring, interpreting and analyzing the Rorschach, with an emphasis on its clinical use with children and adolescents.  
Prerequisite: Approval of instructor and department head.

EPSY 629 Educational Planning for the Gifted and Talented  
Credits 3.3 Lecture Hours.  
Theoretical issues confronting educators involved in program development for gifted and talented children and adolescents; analysis of educational perspectives and instructional implications.  
Prerequisites: Graduate classification and approval of department head.

EPSY 630 Single-Case Research  
Credits 3.3 Lecture Hours.  
Provides skills to conduct research with N=1 designs in the area of special education, school counseling and school psychology; provides the procedures and applications to scenarios in classroom and clinic settings; collect and analyze data in three mini studies.  
Prerequisite: Approval of instructor and department head.

EPSY 631 Program Evaluation  
Credits 3.3 Lecture Hours.  
Learning of key evaluation skills: establishing focus with client, posing evaluation questions, data collection techniques, designing for internal validity, data aggregation; scenario practice.  
Prerequisite: EPSY 635 or equivalent.

EPSY 635 Educational Statistics  
Credits 3.2 Lecture Hours. 3 Lab Hours.  
Introduction to the theory and application of statistical methods in behavioral science research with emphasis on classroom applications.  
Prerequisite: Approval of instructor.

EPSY 636 Techniques of Research  
Credits 3.3 Lecture Hours.  
Fundamental concepts and tools of research applied to psychological and educational problems; rationale of research, analysis of problems, library skills, sampling, appraisal instruments, statistical description and inference, writing the research report and representative research designs.  
Prerequisite: Approval of department head.
EPSY 637 Qualitative Grounded Theory Methodologies
Credits 3.3 Lecture Hours.
Methods of collecting qualitative data to answer educational or psychological questions using Grounded Theory methodologies; analysis and interpretation of data using Grounded Theory methodologies.
Prerequisites: Graduate classification; introductory course in qualitative methods; and approval of instructor.

EPSY 640 Experimental Design in Education I
Credits 3.3 Lecture Hours.
Preparation in experimental research design in educational studies; application of statistical methods in these designs.
Prerequisites: EPSY 636 or equivalent; approval of department head.

EPSY 641 Experimental Design in Education II
Credits 3.3 Lecture Hours.
Preparation in research design in educational studies; application of statistical methods in these designs.
Prerequisites: EPSY 640; approval of instructor and department head.

EPSY 642 Meta-Analysis of Behavioral Research
Credits 3.3 Lecture Hours.
Principles and use of quantitative techniques for research integration in education and other behavioral disciplines; computer-based and branching literature searches, coding protocols, theory of effect size estimation, analysis and reporting.
Prerequisites: EPSY 435 or STAT 651; EPSY 636 or equivalent; approval of department head.

EPSY 643 Applied Multivariate Methods
Credits 3.3 Lecture Hours.
This seminar presents various techniques for applied multivariate modeling of phenomena in educational psychology.
Prerequisites: EPSY 640 and EPSY 641 or approval of instructor; approval of department head.

EPSY 644 Creative Genius
Credits 3.3 Lecture Hours.
Analysis of patterns of development among highly creative individuals; required dramatic presentation on the life and accomplishments of a selected individual through the use of the soliloquy stage technique.
Prerequisite: Graduate classification; approval of department head.

EPSY 646 Issues in Child and Adolescent Development
Credits 3.3 Lecture Hours.
Theoretical orientations, issues, research strategies and empirical findings of developmental psychology relevant to education.
Prerequisites: PSYC 634 or equivalent; approval of department head.

EPSY 647 Lifespan Development
Credits 3.3 Lecture Hours.
Issues and models of studying lifespan development; research and theory of lifespan development; comprehensive and current foundation of lifespan development.
Prerequisite: Graduate classification; approval of department head.

EPSY 648 Intelligence and Creativity
Credits 3.3 Lecture Hours.
Considers theory, research, methodologies and issues related to the definition, identification and assessment of intelligence, and assessment of intelligence and creativity; addresses theories of intelligence and creativity; methodologies and issues related to assessment of both; relationship between them; and frameworks for fostering creativity; considers implications/applications of theory and research on effective teaching practices for creativity.
Prerequisite: Graduate classification; approval of department head.

EPSY 650 Multiple Regression and Other Linear Models in Education Research
Credits 3.3 Lecture Hours.
Overview of basic and advanced topics in regression analysis; equal emphasis on developing procedural knowledge, statistical theory, research designs, and practical issues and methods using statistics in empirical research; basis of linear regression models and logistic regression models.
Prerequisites: EPSY 641 or STAT 652 or SOCI 631; graduate classification; approval of department head.

EPSY 651 Theory of Structural Equation Modeling
Credits 3.2 Lecture Hours. 3 Lab Hours.
Introduction to the theory and application of structural equation modeling.
Prerequisites: EPSY 640 and EPSY 641 or STAT 650 and STAT 651; graduate classification; approval of department head.

EPSY 652 Theory of Hierarchical Linear Models
Credits 3.3 Lecture Hours.
Introduction to the theory and application of hierarchical linear models.
Prerequisite: EPSY 640, EPSY 641 or STAT 651, STAT 652, or any equivalent courses; some knowledge on ANOVA and Multiple Regression; graduate classification; approval of department head.

EPSY 653 Advanced Structural Equation Modeling
Credits 3.3 Lecture Hours.
Advanced topics of structural equation models; includes exploratory factor analysis under the structural equation modeling framework, testing factorial invariance, structural equation models with categorical observed variables, multilevel structural equation models, latent growth models, and growth mixture models.
Prerequisites: EPSY 651 and EPSY 652.

EPSY 654 Longitudinal Data Analysis
Credits 3.3 Lecture Hours.
Review of traditional approaches to longitudinal data analysis (e.g., MANOVA); consideration of newer approaches including multilevel modeling (MLM) and latent growth modeling (LGM) and their advantages in analyzing longitudinal data.
Prerequisite: EPSY 651 and EPSY 652.

EPSY 655 Item Response Theory
Credits 3.3 Lecture Hours.
Advanced measurement topics in item response models; theoretical foundations and practical applications of IRT models; dichotomous and polytomous IRT models including Rasch model (IPL model), 2-PL model, 3-PL model, rating scale model, partial credit model, and graded response model; analysis based on each model illustrated using BILOG-MG, PARSSCALE, and M-plus.
Prerequisite: EPSY 625.

EPSY 656 Survey Instrument Development
Credits 3.3 Lecture Hours.
Experiences in developing instruments to measure cognition, attitude or behavior; issues and practices relating to construct specification, instrument design and administration; emphasis on analysis and summary of validity study data.
Prerequisites: Graduate classification; EPSY 640 or equivalent; approval of department head.

EPSY 659 Practicum in Educating the Gifted and Talented
Credits 3.1 Lecture Hour. 6 Other Hours.
Theory and strategies for instruction and guidance of the gifted and talented through a supervised experience in a laboratory setting with gifted and talented children and/or adolescents. May be taken three times for credit.
Prerequisite: Approval of instructor and approval of department head.
Course Descriptions

EPSY 673 Learning Theories
Credits 3. 3 Lecture Hours.
Comprehensive study of classical and current learning theories; their significance to modern education.
Prerequisite: Approval of department head.

EPSY 679 Research on Teacher Effectiveness
Credits 3. 3 Lecture Hours.
Considers theory, research and methodologies related to the definition and identification of effective teaching practices; practice, implications and applications of theory and research in educational psychology on effective teaching practices.
Prerequisites: Graduate classification; approval of department head.

EPSY 682 Seminar in...
Credit 1. 1 Other Hour.
Knowledge, skills and attitudes in special education, counseling, psychological foundations of education and school psychology. Specific topics are announced for each seminar offered. May be taken more than once but not to exceed 6 hours of credit.
Prerequisite: Approval of department head.

EPSY 683 Field Practicum in...
Credits 1 to 15. 1 to 15 Other Hours.
Supervised experience in professional employment settings in educational psychology. Wide range of practical experiences and activities as listed below that are closely supervised by departmental faculty. Repeatable to 15 hours total.
Prerequisite: Approval of instructor and department head.

EPSY 684 Professional Internship
Credits 1 to 4. 1 to 4 Other Hours.
Limited to advanced doctoral students; University-directed experience in a professional employment setting; full-time participation and responsibility in experiences related to career specializations in counseling or school psychology. Repeatable to 9 hours total.
Prerequisites: Approval of department head six weeks prior to registration; approval of department head.

EPSY 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed individual study of selected problems.
Prerequisite: Approval of department head.

EPSY 688/CPSY 688 Research Proposal Development
Credits 4. 3 Lecture Hours. 2 Lab Hours.
This seminar models the processes of developing and defending research proposals.
Prerequisites: EPSY 640 and EPSY 641 or approval of instructor; approval of department head.
Cross Listing: CPSY 688/EPSE 688.

EPSY 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of educational psychology. May be repeated for credit.
Prerequisite: Approval of department head.

EPSY 690 Theory of Educational Psychology Research
Credits 3. 3 Lecture Hours.
Theory and design of research problems and experiments in various subfields of educational psychology; communication of research proposals and results; evaluation of current research of faculty and students and review of current literature. May be repeated for credit.
Prerequisite: Approval of instructor and department head.

EPSY 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research for thesis or dissertation.
Prerequisite: Approval of department head.

ESET - Electronic Sys Eng Tech

Courses

ESET 151 Engineering Leadership
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Engineering Leadership. Exploration of Emotional Intelligence (EI), identification of personal EI competencies and areas for improvement, and development of these competencies and skills; determination of techniques to anticipate and manage our emotions, and to anticipate and work with the emotions of others.

ESET 210 Circuit Analysis
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Electric and magnetic principles of components used in DC and AC circuits; transient analysis; phasor analysis; Ohm's and Kirchhoff's laws, Thevenin's and Norton's theorems, mesh and nodal equations; measurement of current, voltage and waveforms with meters and oscilloscopes.
Prerequisite: MATH 151.

ESET 211 Power Systems and Circuit Applications
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Fundamentals of energy systems; power generation/distribution; motors/generators; AC power analysis; power factor correction; application of Thevenin's and Norton's Theorems, Superposition Theorem, and Mesh and Nodal analysis; resonant circuits; passive filters; nonsinusoidal circuits; pulse waveforms; measurements of AC circuits; circuit analysis using Multisim.
Prerequisites: ESET 210; MATH 152.

ESET 219 Digital Electronics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Survey of digital applications, number systems, digital logic devices and circuits, sequential logic.

ESET 250 Introduction to Electronics Technology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Hardware and software tools used in the electronics industry; software tools include LabVIEW and PSPICE; designed for anyone who needs knowledge, awareness and working familiarity of the software tools used in industry.

ESET 269 Embedded Systems Development in C
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Introduction to programming using the C programming language and embedded microcontroller systems; fundamental language syntax and symantics, concentration of the application to embedded systems.
Prerequisites: ESET 219 or registration therein; electronic systems engineering technology major.

ESET 315 Local-and-Metropolitan-Area Networks
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Design, operation, application and management of LANs and MANs; topologies, cabling systems, protocols, bridges, routers, hubs, switches, security; media and transport systems; Internet and TCP/IP topics including the protocol stack, router operation and addressing issues.
Prerequisites: ESET 219; electronic systems engineering technology major.
**ESET 329 Six Sigma and Applied Statistics**  
**Credits 3. 2 Lecture Hours. 3 Lab Hours.**  
Concepts of probability and statistics, mean, variance, Gaussian/uniform/Student/Weibull distributions, and their applications in electronics design, analysis, and troubleshooting; Six Sigma process and tools including Gauge R&R, test of hypotheses, analysis of variance, linear regression, response surface method, control chart, and design of experiments.  
**Prerequisites:** Grade of C or better in ESET 210 and MATH 152; completion of ENGL 104, MATH 151, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; junior or senior classification in electronic systems engineering technology.

**ESET 333 Product Development**  
**Credits 3. 2 Lecture Hours. 3 Lab Hours.**  
Process of product development to create an idea; development of a business plan; market research; voice of customer; managing resources; project management; identifying product partners; creating a unique product and/or company.  
**Prerequisite:** Completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; junior or senior classification in electronic systems engineering technology.

**ESET 349 Microcontroller Architecture**  
**Credits 4. 3 Lecture Hours. 3 Lab Hours.**  
Microcontrollers including type of circuits and how they function; architecture of microcontrollers; instruction sets and how they are programmed.  
**Prerequisites:** Grade of C or better in ESET 219 and ESET 269; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; electronic systems engineering technology.

**ESET 350 Analog Electronics**  
**Credits 4. 3 Lecture Hours. 3 Lab Hours.**  
Study of semiconductor devices including diodes, field effect transistors, bipolar junction transistors, and operational amplifiers; applications include signal conditioning, power supplies, active filters, discrete transistor amplifiers, and transistor switching/driver circuits.  
**Prerequisites:** ESET 211 with a grade of C or better; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; junior or senior classification in electronic systems engineering technology.

**ESET 352 Electronics Testing I**  
**Credits 4. 3 Lecture Hours. 3 Lab Hours.**  
Testing of electronic devices and systems; including test planning, test reporting, test specifications, parametric testing, measurement accuracy, test hardware, sampling theory, digital signal processing based testing, and calibrations; both circuit analysis (2/3) and circuit design (1/3) with several analog and mixed-signal systems.  
**Prerequisites:** ENTC 350 with a grade of C or better; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; junior or senior classification in electronic systems engineering technology.

**ESET 355 Electromagnetics and High Frequency Systems**  
**Credits 4. 3 Lecture Hours. 3 Lab Hours.**  
High frequency concepts including topics in basic electromagnetics, transmission lines, antennas, and RF circuit design; applications including wireless communication systems, fiber optic systems, and high frequency PCB layout.  
**Prerequisites:** Grade of C or better in ESET 211 and PHYS 208; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; junior or senior classification in electronic systems engineering technology.

**ESET 359 Electronic Instrumentation**  
**Credits 4. 3 Lecture Hours. 3 Lab Hours.**  
Fundamentals of controls, measurement systems, sensors, sampling theorem, analog to digital and digital to analog conversions; signal conditioning; digital signal processing; computer-based data acquisition using graphical development environment; and digital communication protocols.  
**Prerequisites:** Grade of C or better in ESET 349 and ESET 350; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; junior or senior classification in electronic systems engineering technology.

**ESET 366 Communications Electronics**  
**Credits 3. 2 Lecture Hours. 3 Lab Hours.**  
Fundamentals of system approach to the design of communication electronics circuit; amplitude and frequency modulation techniques; application to the design of circuit level amplitude and frequency modulation; design techniques; transmission lines; wave propagation and optical/laser technologies.  
**Prerequisites:** ESET 350, admission to upper level in electronics engineering technology.

**ESET 369 Embedded Systems Software**  
**Credits 4. 3 Lecture Hours. 3 Lab Hours.**  
A study of the technical aspects of embedded computer software systems, with emphasis on embedded real-time systems, programming techniques and development methodologies.  
**Prerequisites:** ESET 349 with a grade of C or better; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; junior or senior classification in electronic systems engineering technology.  
**Corequisite:** ENTC 350.

**ESET 415 Advanced Network Systems and Security**  
**Credits 3. 2 Lecture Hours. 3 Lab Hours.**  
Practical network systems and security; topics include network design and protocol such as VLAN, HSRP, IP Routing, MPLS, and SAN; network security such as ACLs, TCP/IP security, IDS, and VPN; network service and management such as DHCP, DNS, NAT, SNMP, and MIB; and network verification and testing.  
**Prerequisites:** ESET 315 with a grade of C or better; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; junior or senior classification in electronic systems engineering technology.

**ESET 419 Engineering Technology Capstone I**  
**Credits 3. 3 Lecture Hours.**  
Project management tools for a formal technical proposal; addresses scope, schedule, risk, cost, milestones and deliverables; planning and initial design of prototype implemented in ESET 420; teams must have sponsor and technical advisor.  
**Prerequisites:** Grade of C or better in ESET 369 and ESET 333; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; senior classification in electronic systems engineering technology.
ESET 420 Engineering Technology Capstone II  
**Credits 2. 6 Lab Hours.**  
Second semester course in capstone design sequence; focus on design implementation, testing, documentation, demonstration, and presentation of a fully functional prototype; professional design tools for schematic capture, printed circuit board layout and software development, integration and validation.  
**Prerequisites:** Completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; senior classification in electronic systems engineering technology; final semester of technical coursework and successful completion of ESET 419 or approval of department.  

ESET 435 Data Communications  
**Credits 3. 2 Lecture Hours. 3 Lab Hours.**  
Data communications concepts and techniques involving error detection and correction, data link control, switching, client-server computing, data compression, data security, internet protocol (IP), transmission control protocol (TCP), includes development of a data link control layer and a client server system utilizing socket by using C Programming Language in Visual C++ environment.  
**Prerequisites:** ESET 315 and ESET 369 with a grade of C or better; junior or senior classification in electronic systems engineering technology.  

ESET 452 Electronics Testing II  
**Credits 3. 2 Lecture Hours. 3 Lab Hours.**  
Advanced testing techniques of electronic devices and systems; study of advanced electronics test methodologies; emphasis on circuits containing analog to digital converters (ADCs) and digital to analog converters (DACs); device interface board design and data analysis; both circuit analysis (2/3) and circuit design (1/3) using industry grade state-of-the-art equipment.  
**Prerequisites:** Grade of C or better in ESET 349 and ESET 352; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; junior or senior classification in electronic systems engineering technology.  

ESET 455 Wireless Transmission Systems  
**Credits 4. 3 Lecture Hours. 3 Lab Hours.**  
System engineering aspects of microwave, satellite and cellular communication systems; power budget calculations, propagation analysis, systems descriptions; CNR, CIR; review of modulations practical engineering considerations.  
**Prerequisites:** ESET 355 with a grade of C or better; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; junior or senior classification in electronic systems engineering technology.  

ESET 462 Control Systems  
**Credits 4. 3 Lecture Hours. 3 Lab Hours.**  
Fundamentals of real-time closed-loop analog and digital control (the proportional, integral and derivative controller); distributed control systems, sensors, electronics, stepper and servo motors on a 16-bit microcontroller platform; design an autonomous vehicle; open industrial networks, such as Control Area Network (CAN) and DeviceNet technologies, will be discussed.  
**Prerequisites:** Grade of C or better in ESET 359 and ESET 369; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; junior or senior classification in electronic systems engineering technology.  

**Courses**  

**ESSM 102 Introduction to Natural Resources and Ecosystem Management**  
**Credit 1. 1 Lecture Hour.**  
Introduction to natural resources and ecosystem system approach to wildland management; survey of the field of natural resources and related industries.  

**ESSM 201 Exploring Ecosystem Science and Management**  
**Credit 1. 1 Lecture Hour.**  
Exploration of knowledge, skills and abilities required for varied careers within ecosystem science and management; development of a professional portfolio and résumé; exploration of career options through team approach; conduct one service project.  

**ESSM 203 Forest Trees of North America**  
**Credits 3. 2 Lecture Hours. 2 Lab Hours.**  
(FORE 1314) Forest Trees of North America. Taxonomy, phylogeny, and identification of the important forest trees of North America and their ecological and social uses and benefits.  
**Prerequisites:** BIOL 101, BIOL 107, BIOL 111 or BIOL 113 and BIOL 123 or equivalent.  

**ESSM 291 Research**  
**Credits 1 to 4. 1 to 4 Other Hours.**  
Research conducted under the direction of faculty member in ecosystem science and management. May be repeated 2 times for credit.  
**Prerequisites:** Freshman or sophomore classification and approval of instructor.  

**ESSM 300 Field Studies in Forest Ecosystems**  
**Credits 3. 1 Lecture Hour. 6 Lab Hours.**  
Field-oriented focus on forest ecosystem science and management; problem-solve management questions through data collection and team-based research; investigate the relationships between landowner objectives, mensuration, silviculture, ecology, soils, and regeneration-focused harvesting systems; foster the development of student-faculty relationships; enhance professional knowledge and skills.  
**Prerequisite:** Junior or senior classification or approval of instructor.*  

**ESSM 301 Wildland Watershed Management**  
**Credits 3. 2 Lecture Hours. 2 Lab Hours.**  
Elements of watershed management and principles and practices of wildland management for protection, maintenance and improvement of water resource values.  
**Prerequisite:** Junior or senior classification or approval of instructor.*  

**ESSM 302 Wildland Plants of North America**  
**Credits 3. 2 Lecture Hours. 2 Lab Hours.**  
Familiarization with the distribution and economic value of important wildland plants in Texas and North America and fundamentals of sight identification of these plants; plant collection required.  
**Prerequisite:** Junior or senior classification or approval of instructor.*  

**ESSM 303 Agrostology**  
**Credits 3. 1 Lecture Hour. 6 Lab Hours.**  
Classification and identification of grasses based on macro- and micromorphological variations of spikelets; interpretation of spikelet variation and use of diagnostic keys to identify important species of North America; a grass collection required.  
**Prerequisites:** Junior or senior classification or approval of instructor.*  

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**ESSM Ecosystem Science & Mgmt**
ESSM 304 Rangeland Plant Taxonomy
Credits 4.2 Lecture Hours. 6 Lab Hours.
Interpretation of plant morphology for keying and identification of important flowering rangeland plants; vegetative and floral characters for important plant families including toxic compounds affecting domestic livestock. Plant collection required.
Prerequisites: Junior or senior classification or approval of instructor.*

ESSM 305 Watershed Analysis and Planning
Credits 3.3 Lecture Hours.
Provide an integrated framework for watershed planning that addresses the related biophysical, social and economic issues; comprehensive in scope and approach giving students the tools and techniques for developing sound watershed management policy and practice; water issues, problems and regulations for Texas.
Prerequisite: Junior or senior classification.*

ESSM 306 Plant Functional Ecology and Adaptation
Credits 3.3 Lecture Hours.
Investigation of physiological mechanisms influencing ecological patterns and processes, including plant acclimation and adaptation in contrasting habitats; abiotic controls on species productivity and distribution; underlying genetic and evolutionary mechanisms contributing to the occurrence of specific genotypes and phenotypes in unique environments.
Prerequisites: RENR 205, any BIOL course, junior or senior classification or approval of instructor.

ESSM 307 Forest Protection
Credits 3.2 Lecture Hours. 3 Lab Hours.
Destructive agents in forestry as related to importance, identification, cause, extent of losses and protective measures.
Prerequisites: RENR 205, AGEC 105 or equivalent, junior or senior classification or approval of instructor.*

ESSM 308 Fundamentals of Environmental Decision-Making
Credits 3.3 Lecture Hours.
Introduction to environmental issues in natural resources management; fundamental principles and methods for understanding biosocial interdependencies in complex environmental issues; use of computer-aided group decision-making techniques to develop cooperative strategies for resolving local or global environmental issues.
Prerequisite: Junior or senior classification or approval of instructor.*

ESSM 309 Forest Ecology
Credits 3.3 Lecture Hours.
Life history and general characteristics of trees; structure and function of forest ecosystems; fundamental principles of forest tree physiology and ecology applied to an analysis of tree growth in relation to environmental factors and present day forest management; global changes and forests.
Prerequisite: Junior or senior classification or approval of instructor.*

ESSM 311 Biogeochemistry and Global Change
Credits 3.3 Lecture Hours.
Framework for understanding biogeochemical cycles, their significance at both global and ecosystem levels of organization, and their contemporary relevance to ecosystem science and management.
Prerequisites: RENR 205, RENR 215, any BIOL and/or CHEM course, junior or senior classification or approval of instructor.

ESSM 313 Vegetation Sampling Methods and Designs in Ecosystems
Credits 3.2 Lecture Hours. 2 Lab Hours.
Basis for vegetation sampling in ecosystems; methods for conducting sampling; selection of sampling unit appropriate for vegetation type; sampling statistics; mean comparisons; regression analysis; sampling design principles; development of sampling plan; presentation and interpretation of sampling data.
Prerequisites: Any MATH course satisfying university core curriculum, junior or senior classification or approval of instructor.

ESSM 314 Principles of Rangeland Management Around the World
Credits 3.3 Lecture Hours.
Basic knowledge of world rangeland ecosystems, how these systems are managed in diverse cultural settings; principles of underlying ecological processes influenced by various land management practices; foster understanding of the values that people in different countries place on rangeland resources; use of these values to enhance geologically sustainable and socially acceptable rangeland management practices.*
Prerequisite: Junior or senior classification or approval of instructor.

ESSM 315 Rangeland Inventory and Monitoring
Credit 1.2 Lab Hours.
Theory and methods to inventory rangeland vegetation; sampling design; analysis of inventory data; interpretation of sampling data; preparation of a technical report; presentation of inventory data in text, tables, and graphs using the style of the Rangeland Ecology and Management discipline.
Prerequisites: ESSM 313, junior or senior classification or approval of instructor.*

ESSM 316 Range Ecology
Credits 3.2 Lecture Hours. 2 Lab Hours.
Organization and distribution of rangeland ecosystems of the world, with emphasis on North America; community dynamics and functions stressed including biotic history, succession, disturbance regimes, competitive interactions, herbivory, energy flow and nutrient cycling; conservation of rangeland resources.
Prerequisites: RENR 205, RENR 215, ESSM 302, ESSM 314, ESSM 315, junior or senior classification or approval of instructor.*

ESSM 317 Vegetation Management
Credits 3.3 Lecture Hours.
Familiarization with practices that cause changes in rangeland vegetation composition for multiple uses; understanding of criteria for range improvement practices; comparison of expected responses of livestock forage production, watershed parameters and wildlife to vegetation changes following range improvements; systems concept for planning, analysis and implementation of range improvement practices.
Prerequisites: ESSM 314, junior or senior classification or approval of instructor.*

ESSM 318 Coupled Social and Ecological Systems
Credits 3.3 Lecture Hours.
Resilience-based stewardship of social-ecological systems; ecological concepts of resilience, sustainability, ecosystem services, and vulnerability; investigation of linkages among social and ecological system components; contribution to sustainability and provisioning of ecosystem services; evaluation of multiple knowledge sources as the basis for adaptive ecosystem management.
Prerequisites: RENR 205, AGEC 105 or equivalent, junior or senior classification or approval of instructor.
ESSM 319 Principles of Forestry  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Theory and practice of forestry in controlling forest establishment, composition, structure and growth; principles of natural and artificial regeneration; intermediate cultural operations; silvicultural systems; use and control of fire in forests; principles of sustainable stand management.  
Prerequisite: Junior or senior classification or approval of instructor.

ESSM 320 Ecosystem Restoration and Management  
Credits 3. 3 Lecture Hours.  
A basic conceptual framework for restoration ecology and ecological restoration; major principles of ecology related to practical problems confronting humankind, such as, environmental pollution and degradation, exotic species invasions, land use and management trade-offs and consequences; importance of biological diversity.  
Prerequisite: RENR 205, RENR 215 or equivalent, junior or senior classification or approval of instructor.*

ESSM 351 Geographic Information Systems for Resource Management  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Geographic Information Systems (GIS) approach to solving spatial problems and managing natural resources, including the capture, analysis, manipulation and mapping of spatial and non-spatial databases; identification of natural and cultural features from aerial photography and remote sensing products; integration of GPS technologies; extensive use of GIS software to solve real-world problems.  
Prerequisite: Junior or senior classification or approval of instructor.

ESSM 398 Interpretation of Aerial Photographs  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Identification and evaluation of natural and cultural features on aerial photographs; methods for extracting information concerning land use, vegetative cover, surface and structural features, urban/industrial patterns and archaeological sites.  
Prerequisite: Junior or senior classification or approval of instructor.

ESSM 405 Forest Resource Assessment and Management  
Credits 3. 1 Lecture Hour. 4 Lab Hours.  
Integration of biophysical, economic and social factors in forest resource analysis, management planning and decision making; applications of interdisciplinary knowledge and multiple-use principles to practical forest management problems.  
Prerequisite: Senior classification or approval of instructor.

ESSM 406 Natural Resources Policy  
Credits 3. 3 Lecture Hours.  
Natural resources and forest policy development in the United States and review of current issues in forest and related natural resource policy.  
Prerequisite: Junior or senior classification or approval of instructor.

ESSM 415 Range Analysis and Management Planning  
Credits 4. 3 Lecture Hours. 2 Lab Hours.  
Basic concepts and theories of range management systems. Resource inventory, analysis and management planning.  
Prerequisite: ESSM 314, junior or senior classification or approval of instructor.*

ESSM 416 Fire Ecology and Natural Resource Management  
Credits 3. 3 Lecture Hours.  
Behavior and use of fire in the management of natural resources; principles underlying the role of weather, fuel characteristics and physical features of the environment related to the development and implementation of fire management plans.  
Prerequisite: RENR 205 or equivalent, junior or senior classification or approval of instructor.

ESSM 420 Ecological Restoration of Wetland and Riparian Systems  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
How wetland and riparian areas link terrestrial and aquatic systems and function hydrologically and ecologically within watersheds; integrated approaches for restoration of degraded wetland and riparian systems; improving water resources through vegetation management with a special interest in rangelands.  
Prerequisites: RENR 205, junior or senior classification or approval of instructor.

ESSM 430 Advanced Restoration Ecology  
Credits 3. 3 Lecture Hours.  
A dynamic discipline relying heavily on the fundamentals of ecology; practice translating and communicating key ecological concepts to advanced case studies in ecological restoration; enhance skills for professional applications.  
Prerequisites: RENR 205 and ESSM 320 or ESSM 420; junior or senior classification.

ESSM 440 Wetland Delineation  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Covers the application of the 1987 Wetland Delineation Manual in use by the Army Corps of Engineers (CORPS); field indicators of hydrophytic vegetation; hydric soils, wetland hydrology, methods for making jurisdictional determinations in non-disturbed and disturbed areas, recognition of problem wetlands and technical guidelines for wetlands.  
Prerequisite: Junior or senior classification.*

ESSM 444 Remote Sensing of the Environment  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Principles and techniques necessary for applying remote sensing to diverse issues in studying and mapping land uses and land covers of the terrestrial environment; emphasizes a hands-on learning approach with theoretical foundations and applications in both aerial and satellite remote sensing, using optical and lidar datasets.  
Prerequisite: Junior or senior classification or approval of instructor.

ESSM 459 Spatial Databases and Programming  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Computational tools for creating new data, sharing, integrating that data with other databases; conducting analyses and interpretation of information ranging from spreadsheets to advanced scientific workflow processing systems; tools to create higher quality, more useful data.  
Prerequisite: Junior or senior classification or approval of instructor.

ESSM 460 Spatial Data Acquisition with Field Methods  
Credits 2. 1 Lecture Hour. 2 Lab Hours.  
Laboratory-oriented advanced field-based vegetation and soil mensuration methods; sampling design, vegetation and soil parameters, and data collection; use of global positioning systems (GPS), ultrasound distance measurement and plant diameter, laser hypsometers, digital cameras, ground penetrating radar (GPR), spectroradiometers, leaf area meters, soil moisture meters, terrestrial laser scanners (TLS).  
Prerequisites: ESSM 300 or ESSM 313, junior or senior classification or approval of instructor.
ESSM 462/GEOG 462 Advanced GIS Analysis for Natural Resource Management
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Advanced topics in Geographic Information Systems (GIS) to solve natural resource problems; manipulation of raster data types; three-dimensional modeling; emphasis on geoprocessing as it relates to applied projects, particularly with habitat suitability models; field and lab use of Global Positioning Systems (GPS); internet-based GIS modeling.
Prerequisites: ESSM 351 or AGSM 461/SPSC 461 or equivalent or approval of instructor; junior or senior classification.
Cross Listing: GEOG 462/ESSM 462.

ESSM 464 Spatial Project Management
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Integration of key components of spatial project management to ensure a successful project implementation using life-cycle methodology and spatial project management; strategy and planning, requirements analysis, design, development, deployment, and operations and maintenance; term project working with real world data to develop and manage a spatial project for practical applications.
Prerequisites: A minimum of two GIS and/or remote sensing courses at 300 or 400-level, junior or senior classification or approval of instructor.

ESSM 481 Senior Seminar
Credit 1. 1 Lecture Hour.
Completion of professional e-portfolio, résumé and job application; exploration of job search, application, and interview; discipline competency exams; program evaluation.
Prerequisite: Senior classification in ESSM degree program.*

ESSM 484 Internship
Credits 1 to 4. 1 to 4 Other Hours.
Supervised experience program conducted in the student's area of specialization.
Prerequisite: Approval of student's advisor.

ESSM 485 Directed Studies
Credits 1 to 3. 1 to 3 Hours.
Individual study and research upon a selected range problem.
Prerequisite: Approval of student's advisor.

ESSM 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of rangeland ecology and management. May be repeated for credit.
Prerequisite: Approval of instructor.*

ESSM 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in ecosystem science and management. May be repeated 3 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor.

ESSM 600 Principles of Ecosystem Science and Management
Credits 3. 3 Lecture Hours.
Ecological foundations for sustained use of natural resources; climatic, edaphic, biotic and cultural factors in land resource allocation; land and cover viewed with respect to population dynamics, succession and climax, gradients and graduation, equilibria and imbalance.
Prerequisite: Graduate classification in agriculture or in allied subject.*

ESSM 601 Ecosystem Stewardship
Credits 3. 3 Lecture Hours.
Integrates ecological concepts of resilience, sustainability, transformation and vulnerability within a framework of ecosystem stewardship to support human well-being in a rapidly changing world; emphasizes social-ecological systems, adaptive management, and valuation of ecosystem services as mechanisms to strengthen management and policy recommendations supporting ecosystem stewardship.
Prerequisite: Graduate classification.

ESSM 605 The Research Process
Credits 2. 2 Lecture Hours.
Nature and objectives of graduate work, the scientific method and basic and applied research. Introduction to design of experiments and analysis of data; principles of organization of project proposals, theses and scientific reports.

ESSM 610 Rangeland Resource Management
Credits 3. 3 Lecture Hours.
Basic concepts and theories of rangeland resource management; trends in range classification, grazing management and improvement practices.
Prerequisite: Graduate classification in agriculture or related subject matter areas.*

ESSM 611 Grazing Management and Range Nutrition
Credits 3. 3 Lecture Hours.
Nutritional ecology of domestic and wild herbivores on rangelands; vegetation and animal response to various grazing management practices; diet selection, quality, intake and supplementation of herbivores.*

ESSM 612 Rangeland Vegetation Management
Credits 3. 3 Lecture Hours.
Principles of rangeland brush and weed control with mechanical, chemical, burning and biological methods; interrelationships of brush management with grazing, wildlife and watershed management; planning and economic analysis of range improvement practices.*

ESSM 616 Arboriculture
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Tree selection and planting to fit climatic, space and edaphic conditions, diagnosing tree abnormalities, and practicing intensive tree care; frequent field work and demonstrations; includes seminar classes involving discussions and presentations of current arboriculture research from peer-reviewed journals.
Prerequisite: Graduate classification.

ESSM 617 Urban Forestry
Credits 4. 4 Lecture Hours.
Conceptual role of trees in improving the urban environment; optimum use of existing forested areas and the establishment of trees in appropriate open spaces; tree ordinances, species evaluation, street tree planning and tree inventory systems; includes seminar classes involving discussions and presentations of current urban forestry research from peer-reviewed journals.
Prerequisite: Graduate classification.

ESSM 620 Plant and Range Ecology
Credits 3. 3 Lecture Hours.
Investigation of community/ecosystem/landscape distribution patterns, structure, spatial/temporal organization and function, paleoecology, ecological succession, disturbance regimes, ecological diversity and classification schemes. North American rangelands (grasslands, shrublands, deserts, wetlands, etc.) stressed but world ecosystems reviewed.
Prerequisites: RENR 205; RENR 215 or equivalent; graduate classification.*
ESSM 621 Physiological Plant Ecology  
Credits 3. 3 Lecture Hours.  
Investigation of physiological mechanisms influencing ecological patterns and processes, including plant acclimation and adaptation in contrasting habitats, abiotic controls on species productivity and distribution, relevant conceptual and experimental approaches, and integration among ecological scales.  
Prerequisites: RENR 205 or MEPS 313 or equivalent; graduate classification.

ESSM 622 Biogeochemistry of Terrestrial Ecosystems  
Credits 3. 3 Lecture Hours.  
Biogeochemical cycles of carbon, nitrogen, sulfur and phosphorus and their interaction with biotic and abiotic processes; biogeochemical processes investigated at the global level and in several types of terrestrial ecosystems; addressing global climate change, deforestation, acid precipitation, ozone depletion.  
Prerequisites: RENR 205 or equivalent; graduate classification.

ESSM 624 Terrestrial Ecosystems and Global Change  
Credits 3. 3 Lecture Hours.  
Identify the physical and biological principles governing the structure and function of terrestrial ecosystems in an earth-system context; analyze how plants and microorganisms respond to environmental change and affect global carbon, nutrient, and water cycles; evaluate ecosystem response to global change, including rising carbon dioxide, climate warming, and human impacts.  
Prerequisite: Graduate classification.

ESSM 626 Fire and Natural Resources Management  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Behavior and use of fire in the management of natural resources; principles underlying the role of weather, fuel characteristics and physical features of the environment related to development and implementation of fire plans.  
Prerequisites: Graduate classification and approval of instructor.*

ESSM 628 Wetland Delineation  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Prerequisite: Graduate classification or approval of instructor.

ESSM 630 Restoration Ecology  
Credits 3. 3 Lecture Hours.  
Review and discuss fundamental concepts, current literature, and contemporary topics relating to ecological restoration. This includes the theoretical development of restoration ecology and its application. The relationship with conservation biology will be explored. The goal is to inform, exchange views, and develop critical thinking skills through case studies.  
Prerequisite: Graduate classification.*

ESSM 631 Ecological Restoration of Wetland and Riparian Systems  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
How wetland and riparian areas link terrestrial and aquatic systems and function hydrologically and ecologically within watersheds; integrated approaches for restoration of degraded wetland and riparian systems; improving water resources through vegetation management with a special interest in rangelands.  
Prerequisites: RENR 205 or equivalent and WFSC 428 or equivalent.

ESSM 635 Ecohydrology  
Credits 3. 3 Lecture Hours.  
Framework for understanding how plants and animals affect the water cycle; examine and explore the water cycle in all of its aspects with the idea of understanding how changes in land cover may influence the water cycle; implications for both upland and riparian systems.  
Prerequisite: Graduate classification.

ESSM 636 Range and Forest Watershed Management  
Credits 3. 3 Lecture Hours.  
Management of range and forest watersheds; influence of range and forest practices on runoff, interception, infiltration, erosion and water quality; current literature and research advances.*

ESSM 647 Range Grasses and Grasslands  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Basic concepts of grass structure and classification, recent advances in agrostological research, genetic and ecological basis for patterns of variation and evolution in grasses. Offered Spring Semester of even numbered years.*

ESSM 648 Wetland Plant Taxonomy  
Credits 3. 1 Lecture Hour. 4 Lab Hours.  
Interpretation of plant morphologies for keying and the identification of wetland plants from prime habitats; plant communities including the plant's adaptation to variation in salinity and soils; identification of inconspicuous flowered plant species including sedges, rushes and grasses.  
Prerequisite: RLEM 304 or approval of instructor. Offered Fall Semester of even numbered years.*

ESSM 651/BAEN 651 Geographic Information System for Resource Management  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
(2-2) Geographic Information System (GIS) approach to the integration of spatial and attribute data to study the capture, analysis, manipulation and portrayal of natural resource data; examination of data types/formats, as well as the integration of GIS with remote sensing and Global Positioning System; laboratory includes extensive use of GIS applications to conduct analyses of topics in natural resources.  
Prerequisites: Graduate classification.  
Cross Listing: BAEN 651/ESSM 651.

ESSM 652 Advanced Topics in Geographic Information Systems  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Advanced GIS topics with a focus on modeling actual GIS applications including relational and database theory, design and implementation and its connection to GIS; surface analysis with digital terrain models; and an introduction to statistical techniques.  
Prerequisite: ESSM 651/BAEN 651 or BAEN 651/ESSM 651.

ESSM 655 Remote Sensing of the Environment  
Credits 3. 2 Lecture Hours. 1 Lab Hour.  
Remote sensing for the management of renewable natural resources; use of aerial photography and satellite imagery to detect, identify and monitor forest, range and agricultural resources; utilize remotely sensed data as input to computerized information management systems.  
Prerequisite: Graduate classification.

ESSM 656 Advanced Remote Sensing  
Credits 3. 2 Lecture Hours. 1 Lab Hour.  
Advanced techniques for information extraction using airborne and satellite imagery; active and passive sensors characteristics; customizing and developing image processing tools for remote sensing applications for a broad range of sensors and applications.  
Prerequisites: ESSM 655, RENR 444, GEOG 651, GEOG 661.
ESSM 660 Landscape Analysis and Modeling
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Introduction to quantitative methods of landscape analysis and modeling for applications in natural resource conservation and management; quantification of landscape composition and configuration; spatial statistical methods for characterizing landscape pattern; methods for hypothesis testing with spatial data; landscape modeling approaches and applications; current literature and software. 
Prerequisite: Approval of instructor.

ESSM 663/SCSC 663 Applied Spatial Statistics
Credits 4. 3 Lecture Hours. 2 Lab Hours.
An introduction to the theory and practice of spatial statistics as applied to the natural resources. Spatial analyses focusing primarily on ordinary kriging, point processes, and lattice data. 
Prerequisites: MATH 141, MATH 142; STAT 651; or equivalents; ESSM 651/BAEN 651 preferred. 
Cross Listing: SCSC 663/ESSM 663.

ESSM 665 Computer Programming for Natural Resources Applications
Credits 3. 2 Lecture Hours. 2 Lab Hours.
An introduction to programming concepts and applications; elements of Visual Basic programming including data types, control and program structure; introduction to objects and object-oriented programming; macro and applications development; automation of GIS programming through the use of macros. 
Prerequisites: Approval of instructor.

ESSM 670 Ecosystems and Markets
Credits 3. 3 Lecture Hours.
Concepts and analysis of supply chains for natural resource commodities and ecosystem services. Exploration of the economic uses of goods and services from ecosystems. 
Prerequisite: Graduate classification.

ESSM 671 Ecological Economics
Credits 3. 3 Lecture Hours.
Study of the relationships between ecosystems and economic systems; understanding the effects of human economic endeavors on ecological systems and how the ecological benefits and costs of such activities can be quantified and internalized. 
Prerequisite: Graduate Classification. 
Cross Listing: AGEC 659 and RENR 659.

ESSM 672/RENR 660 Environmental Impact Analysis for Renewable Natural Resources
Credits 3. 3 Lecture Hours.
Analysis and critique of contemporary environmental analysis methods in current use; environmental impact statements; national policies; political, social and legal ramifications as related to development and use of renewable natural resources. 
Prerequisite: Graduate Classification. 
Cross Listing: RENR 660/ESSM 672.

ESSM 675 International Sustainable Community Development
Credits 3. 3 Lecture Hours.
Depicting global trends, paradigms and a comparative framework on sustainable community development; visioning, design, planning and development processes; leadership and management skills; marketing and promotion of sustainability concepts and practices; efficacies, indicators, analytic methods and case analyses; platforms for international cooperation; opportunities and careers in pertinent fields.

ESSM 676/RENR 650 Leadership, Development and Management of Environmental NGOs
Credits 3. 3 Lecture Hours.
Trends and increasing power of NGOs in environment and sustainable development; understanding of the organizational structures, functions, planning and management processes of environmental NGOs; technical skills and leadership qualities for careers with environmental NGOs. 
Prerequisite: Graduate Classification. 
Cross Listing: RENR 650/ESSM 676.

ESSM 681 Seminar
Credit 1. 1 Lecture Hour. 
Reviews and discussions of current topics and advances in Ecosystem Science and Management. 
Prerequisite: Graduate classification.

ESSM 684 Professional Internship
Credits 1 to 16. 1 to 16 Lecture Hours. 
On-the-job training in fields of ecosystem science and management. 
Prerequisite: Graduate classification in an ecosystem science and management major.

ESSM 685 Directed Studies
Credits 1 to 9. 1 to 9 Lecture Hours. 
Investigations not included in student's research for thesis or dissertation. 
Prerequisite: Graduate majors or minors in Ecosystem Science and Management.

ESSM 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours. 
Selected topics in an identified area of ecosystem science and management. May be repeated for credit. 
Prerequisite: Graduate classification.

ESSM 691 Research
Credits 1 to 23. 1 to 23 Lecture Hours. 
Research for thesis or dissertation. 
Prerequisite: Graduate majors in Ecosystem Science and Management.

EURO - European Studies

Courses
EURO 220 Contemporary French Culture
Credit 1. 1 Lecture Hour. 
Cultural and practical orientation for students participating in the summer study abroad programs in France; brief introduction to contemporary social and cultural institutions; discussions of French university system; oral reports and final paper; readings and discussion in English and French. 
Prerequisite: FREN 101 or equivalent.

EURO 223/FREN 223 French Culture and Society in French Literary Masterpieces in Translation
Credits 3. 3 Lecture Hours. 
Analysis and understanding of French culture and contemporary society through the study of masterpieces of French literature including novels, plays, short stories and films. 
Cross Listing: FREN 223/EURO 223.
EURO 230 Contemporary German Culture
Credit 1. 1 Lecture Hour.
Cultural and practical orientation for students participating in the summer study abroad programs in Germany; brief introduction to contemporary social and cultural institutions; discussions of German university system; oral reports and final paper; readings and discussion in English and German.
Prerequisite: GERM 101 or equivalent.

EURO 232 Exploratory German Language and Culture
Credits 3. 3 Lecture Hours.
Introduction to the fundamentals of German language and culture; immersion in a European culture; acquisition of skills and insights necessary to experience life in Germany; study of comparisons and contrasts between German and North American culture.

EURO 237 The German Roaring ’20s
Credits 3. 3 Lecture Hours.
The German Roaring ’20s. The culture of Weimar Germany as a paradigm for European modernity; examination of political and technological modernization through analysis of literary and artistic forms and philosophical and social ideas; taught in English.

EURO 240 Contemporary Russian Culture
Credit 1. 1 Lecture Hour.
Cultural and practical orientation for students participating in the summer study abroad programs in Russia; brief introduction to contemporary social and cultural institutions; discussions of Russian university system; oral reports and final paper; readings and discussion in English and Russian.
Prerequisite: RUSS 101 or equivalent.

EURO 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Individual supervision of readings or assigned projects in European studies selected for each student individually.
Prerequisites: Approval of instructor and department head.

EURO 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of European studies. May be repeated for credit.
Prerequisite: Approval of instructor.

EURO 291 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the direction of faculty member in European languages and cultures. May be taken three times for credit.
Prerequisites: Freshman or sophomore classification and approval of department head.

EURO 311 Diversity Issues in Classical Studies
Credits 3. 3 Lecture Hours.
Study of diversity, "otherness," and tolerance in Greco-Roman antiquity; and the effects of intolerance on modern classical studies.
Prerequisites: ENGL 104 and junior or senior classification.

EURO 323 Immigration and Ethnicity in Contemporary France
Credits 3. 3 Lecture Hours.
Immigration and ethnic groups in contemporary France, their effects on national identity and politics, and their cultural representations.
Prerequisite: ENGL 104 and junior or senior classification.

EURO 405/FILM 405 European Cinema
Credits 3. 3 Lecture Hours.
Exploration of key movements in European cinema from 1895 to the present, including both national cinematic traditions, such as Italian Neorealism or French New Wave, and international trends such as Formalism, Expressionism, or Auteurism.
Prerequisite: FILM 251/ENGL 251 or approval of instructor.
Cross Listing: FILM 405/EURO 405.

EURO 406/FILM 406 Propaganda and Dissidence
Credits 3. 3 Lecture Hours.
Use of film as a medium to promote political ideology, government propaganda, political dissidence, and subversion, with focus on Europe.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: FILM 406/EURO 406.

EURO 432/GERM 432 Music in German Culture
Credits 3. 3 Lecture Hours.
Exploration of key movements in European cinema from 1895 to the present, including both national cinematic traditions, such as Italian Neorealism or French New Wave, and international trends such as Formalism, Expressionism, or Auteurism.
Prerequisite: FILM 251/ENGL 251 or approval of instructor.
Cross Listing: FILM 405/EURO 405.

EURO 436 German Fairy Tales
Credits 3. 3 Lecture Hours.
Introduction to and study of fairy tales and children's literature through German tradition in these forms; reception of fairy tales through adaptation and modernization; taught in English.
Prerequisite: Junior or senior classification, or approval of instructor.

EURO 437/GERM 437 German Romanticism: Literature, Theory, Philosophy
Credits 3. 3 Lecture Hours.
From Goethe's "Faust" to the romantic exaltation of poetry; influence of the romantic movement on European literary theory and philosophy; taught in English.
Prerequisite: Junior or senior classification, or approval of instructor.
Cross Listing: GERM 437.

EURO 441/RUSS 441 The Russian Novel I: Tolstoy and Dostoevsky
Credits 3. 3 Lecture Hours.
Study of the major works of Tolstoy and Dostoevsky; discussion of the literary nature and purpose of novels, especially in the context of Russian culture; taught in English.
Prerequisite: 3 hours of English literature at 200 level or above, or approval of instructor.
Cross Listing: RUSS 441/EURO 441.

EURO 442/RUSS 442 The Russian Novel II: The Twentieth Century
Credits 3. 3 Lecture Hours.
Study of major Russian novels from ca. 1900 to the end of Stalinism; exploration of topics relevant to Russia's experience in the 20th century; taught in English.
Prerequisite: 3 hours of English literature at 200 level or above, or approval of instructor.
Cross Listing: RUSS 442/EURO 442.

EURO 443/RUSS 443 Contemporary Russian Prose
Credits 3. 3 Lecture Hours.
Study of Russian and Soviet 20th-century prose literature, with emphasis on post-Stalinist and post-glasnost writers; taught in English.
Prerequisite: Junior or senior classification, or approval of instructor.
Cross Listing: RUSS 443/EURO 443.
EURO 444/RUSS 444 Russian Drama
Credits 3.3 Lecture Hours.
Introduction to the masterpieces of Russian drama from the 19th century to the present; includes such authors as Pushkin, Chekhov, Gorky, Arbuzov, Rozov and Petrushevskaya; taught in English.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: RUSS 444/EURO 444.

EURO 446/RUSS 446 Russian Artistic Culture I: Beginnings to 1900
Credits 3.3 Lecture Hours.
Masterpieces of Russian art, including architecture, dance, theater, music, and literature, from its beginnings until ca. 1900; taught in English.
Prerequisite: Junior or senior classification, or approval of instructor.
Cross Listing: RUSS 446/EURO 446.

EURO 451/ITAL 451 Introduction to Italian Culture
Credits 3.3 Lecture Hours.
Introduction to the culture of the Italian Peninsula, from Middle Ages to present; study of major works of literature, political science, visual arts, music and cinema, to set Italy’s culture in its social and historical context; taught in English.
Prerequisite: Junior or senior classification or approval of instructor.

EURO 453/ITAL 453 Italian Literature
Credits 3.3 Lecture Hours.
Survey of Italian literature; focus on literary portrayal of reality in modern and contemporary Italian culture, the dialogue with the classical tradition, and literature’s potential to affect and be affected by social critique; taught in English.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: ITAL 453/EURO 453.

EURO 454/ITAL 454 Italian Drama
Credits 3.3 Lecture Hours.
Study of Italian dramatic literature from the origins of Italian theater to the contemporary stage; analysis of the link between theater, opera, and film; taught in English.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: ITAL 454/EURO 454.

EURO 456/ITAL 456 Contemporary Italy
Credits 3.3 Lecture Hours.
Examination of changes in Italian society and culture since World War II, with focus on their narration and interpretation by representative authors and filmmakers, and on multicultural literary production in present-day Italy; taught in English.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: ITAL 456/EURO 456.

EURO 484 Internship
Credits 1 to 3.1 to 3 Other Hours.
Directed Internship in a private firm or public agency to provide experience and learning appropriate to the student's degree program and career objectives. Must be taken on a satisfactory/unsatisfactory basis. May be taken two times for credit.
Prerequisite: Junior or senior classification.

EURO 485 Directed Studies
Credits 1 to 4.1 to 4 Other Hours.
Individual supervision of readings or assigned projects in European studies, selected for each student individually.
Prerequisite: Approval of instructor and department head.

EURO 489 Special Topics in...
Credits 1 to 4.1 to 4 Lecture Hours.
Selected topics in an identified area of European studies. May be repeated for credit.
Prerequisite: Approval of instructor.

EURO 491 Research
Credits 1 to 3.1 to 3 Other Hours.
Research conducted under the direction of faculty member in European languages and cultures. May be taken three times for credit.
Prerequisites: Junior or senior classification and approval of department head.

EURO 601 The Formation of the Republic of Letters
Credits 3.3 Lecture Hours.
The beginnings of European culture in ancient Greece, its development into a Europe-wide civilization under the Roman Empire, and its survival as a common, Latin-based culture in the Middle Ages and Renaissance; deals with literature, the arts, and politics.
Prerequisite: Graduate classification.

EURO 602 The Rise of Modern Nation States
Credits 3.3 Lecture Hours.
Process by which the traditional, Latin-based common culture of Europe is supplemented and supplanted by vernacular cultures tied to the rise of nation states, from the Baroque through the Enlightenment and Romanticism to the nineteenth century; deals with literature, the arts, and politics.
Prerequisite: Graduate classification.

EURO 603 Nationalism and European Integration
Credits 3.3 Lecture Hours.
From the breakdown of civilization in the twentieth century to the determination, difficulties, and potential of reconstituting a common European culture in the post-national era; deals with literature, the arts, politics, film, press, and new media.
Prerequisite: Graduate classification.

EURO 604 European Avantgardes
Credits 3.3 Lecture Hours.
An interdisciplinary examination of modernist currents in art, culture, and politics.
Prerequisite: Graduate classification.

EURO 605 European Cinema
Credits 3.3 Lecture Hours.
An examination of the development of cinematic culture in Europe from the Lumiere brothers' invention of the cinematograph, to the development of national film cultures, to current trends in transnational filmic coproduction.
Prerequisite: Graduate classification.

EURO 606 History and Memory in Modern Europe
Credits 3.3 Lecture Hours.
Explores artistic, cultural, and political representations of fundamental experiences in the shaping of modern Europe, such as the Holocaust, the Nazi occupation of Europe, and Soviet prison camps of the Gulag.
Prerequisite: Graduate classification.
EURO 607 Europe and Its Margins  
Credits 3. 3 Lecture Hours.  
Explores the interaction between European and neighboring cultures, such as those of North and Central Asia, the Middle East, North Africa, and the Atlantic in history.  
Prerequisite: Graduate classification.

EURO 608 European Drama  
Credits 3. 3 Lecture Hours.  
Examines literary, social, and historical aspects of dramatic literature and performance in the context of different European cultures.  
Prerequisite: Graduate classification.

EURO 610 Seminar in Classical Culture  
Credits 3. 3 Lecture Hours.  
Topics in Greek and Roman culture and civilization; readings in English. May be repeated for credit.  
Prerequisite: Graduate classification.

EURO 620 Seminar in French Culture  
Credits 3. 3 Lecture Hours.  
Topics in French culture and civilization; readings in English. May be repeated for credit.  
Prerequisite: Graduate classification.

EURO 630 Seminar in German Culture  
Credits 3. 3 Lecture Hours.  
Topics in German outline and civilization; readings in English. May be repeated for credit.  
Prerequisite: Graduate classification.

EURO 640 Seminar in Russian Culture  
Credits 3. 3 Lecture Hours.  
Topics in Russian culture and civilization; readings in English. May be repeated for credit.  
Prerequisite: Graduate classification.

EURO 650 Seminar in Italian Culture  
Credits 3. 3 Lecture Hours.  
Topics in Italian culture and civilization; readings in English. May be repeated for credit.  
Prerequisite: Graduate classification.

EURO 681 Proseminar  
Credit 1. 1 Lecture Hour.  
Student and faculty presentation of research fields, current issues, and research methods.  
Prerequisite: Graduate classification.

EURO 685 Directed Studies  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Individual problems or research or scholarly activity not pertaining to thesis or dissertation, or selected instruction not covered by other courses. Final documentation of directed study is required.  
Prerequisites: Graduate classification; approval of department head.

EURO 689 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of European Studies. May be repeated for credit.

EURO 691 Research  
Credits 1 to 12. 1 to 12 Lecture Hours.  
Thesis or dissertation research; credit given only upon acceptance of completed thesis or dissertation.  
Prerequisite: Graduate classification.

FILM - Film Studies

Courses

FILM 251/ENGL 251 Introduction to Film Analysis  
Credits 3. 3 Lecture Hours.  
Fundamental aspects of film analysis and criticism.  
Cross Listing: ENGL 251/FILM 251.

FILM 285 Directed Studies  
Credits 0 to 3. 0 to 3 Other Hours.  
Selected fields of film studies not covered in depth by other courses. Reports and extensive reading required. May be repeated for credit.  
Prerequisite: Approval of director of film.

FILM 289 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Special topics in an identified area of film studies.

FILM 291 Research  
Credits 0 to 3. 0 to 3 Other Hours.  
Research conducted under the direction of faculty member in film.  
Prerequisites: FILM 251/ENGL 251 or FILM 301 and freshman or sophomore classification and approval of instructor.

FILM 299 History of Film  
Credits 3. 3 Lecture Hours.  
Historical development of major periods, movements and styles, including several different national cinemas.

FILM 343/WGST 343 Sex, Gender and Cinema  
Credits 3. 3 Lecture Hours.  
Prerequisites: 3 hours in FILM or WGST; junior or senior classification or approval of instructor.  
Cross Listing: WGST 343/FILM 343.

FILM 351/ENGL 351 Advanced Film  
Credits 3. 3 Lecture Hours.  
A different film topic each term; sample topics: major directors; historical periods, fiction into film, film genres. May be repeated for credit.  
Prerequisite: ENGL 251/FILM 251 or FILM 251/ENGL 251 or FILM 301 or approval of instructor; junior or senior classification.  
Cross Listing: ENGL 351/FILM 351.

FILM 356/ENGL 356 Literature and Film  
Credits 3. 3 Lecture Hours.  
Novels and films based on them; writers and filmmakers such as Virginia Woolf, John Steinbeck, John Ford, Sally Potter, John Huston, Charlotte Bronte and Peter Bogdanovich.  
Prerequisites: 3 credits of literature at the 200-level; junior or senior classification or approval of instructor.  
Cross Listing: ENGL 356/FILM 356.

FILM 376/PHIL 376 Philosophy, Film and Evil  
Credits 3. 3 Lecture Hours.  
Application of philosophical methods and analyses to the medium of film; survey of various depictions and treatments of evil within the genre of science fiction; investigation of depictions and treatments of evil arising from consideration of human encounters with alien others.  
Prerequisite: Junior or senior classification.  
Cross Listing: PHIL 376/FILM 376.
FILM 394 Studies in Film Genre
Credits 3. 3 Lecture Hours.
Study of a specific film genre, such as Western, Gangster, Mystery, Science Fiction; genre varies each time course is taught; movies are screened and analyzed along with assigned readings that explore characteristics of the genre and its cultural importance. May be repeated for credit.
Prerequisite: FILM 251/ENGL 251 or ENGL 251/FILM 251.

FILM 401 National Cinema History
Credits 3. 3 Lecture Hours.
Cinema History of a given film-producing nation other than the United States, such as Japanese Film, Swedish Film, South African Film. May be taken three times for credit.
Prerequisites: FILM 301; junior or senior classification.

FILM 402 Intermedia Performance
Credits 3. 3 Lecture Hours.
Study of theory, history, literature and techniques of intermedia composition and design for film, theatre, dance, interactive media, and other forms of performance; examination of the collaborative creative process; projects in interdisciplinary performance.
Prerequisites: Junior or senior classification and MUSC 316, PERF 202, or approval of instructor.
Cross Listing: MUSC 402 and PERF 402.

FILM 405/EURO 405 European Cinema
Credits 3. 3 Lecture Hours.
Exploration of key movements in European cinema from 1895 to the present, including both national cinematic traditions, such as Italian Neorealism or French New Wave, and international trends such as Formalism, Expressionism, or Auteurism.
Prerequisite: FILM 251/ENGL 251 or approval of instructor.
Cross Listing: EURO 405/FILM 405.

FILM 406/EURO 406 Propaganda and Dissidence
Credits 3. 3 Lecture Hours.
Use of film as a medium to promote political ideology, government propaganda, political dissonance, and subversion, with focus on Europe.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: EURO 406/FILM 406.

FILM 415/CLAS 415 The Ancient World in Film
Credits 3. 3 Lecture Hours.
Study of modern films as they relate to ancient literary texts that inspired them or with which they share common themes; relationship between Greek epic, tragedy, and comedy and their cinematic adaptations; treatment of Rome as an idea or ideal in the work of both ancient Romans and modern filmmakers.
Prerequisite: Junior or senior classification, or approval of instructor.
Cross Listing: CLAS 415/FILM 415.

FILM 425/FREN 425 French Film
Credits 3. 3 Lecture Hours.
Overview of French cinema from its origins to the present; interpretation of French cultural history and politics through film; taught in English.
Prerequisite: Junior or senior classification, or approval of instructor.
Cross Listing: FREN 425/FILM 425.

FILM 435/GERM 435 German Film
Credits 3. 3 Lecture Hours.
Consideration and analysis of major works and directors of German Film; interpretation of culture through film; relationship of film to history, literature, and other arts; taught in English. May be repeated for credit.
Prerequisite: Junior or senior classification, or approval of instructor.
Cross Listing: GERM 435/FILM 435.

FILM 455/ITAL 455 Italian Cinema
Credits 3. 3 Lecture Hours.
Survey of Italian cinema from Neorealism to the present; taught in English.
Prerequisites: Junior or senior classification, or approval of instructor.
Cross Listing: ITAL 455/FILM 455.

FILM 481 Seminar in Film Studies
Credits 3. 3 Lecture Hours.
Seminar on a figure, theme, style, movement or theory in film studies, with practice in the methods of research in film studies, culminating in a substantial research paper. Open to seniors enrolled in the interdisciplinary minor in film studies and to others with approval of the Coordinator of Film Studies. May be taken two times for credit.
Prerequisite: 9 hours in film studies courses including FILM 301.

FILM 485 Directed Studies
Credits 0 to 3. 0 to 3 Other Hours.
Selected fields of film studies not covered in depth by other courses. Reports and extensive reading required. May be repeated for credit.
Prerequisite: Approval of director of film.

FILM 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Special topics in an identified area of film studies.
Prerequisite: Junior or senior classification or approval of instructor.

FILM 491 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the direction of faculty member in film.
Prerequisites: FILM 251/ENGL 251 or FILM 301 and junior or senior classification and approval of instructor.

FINC - Finance

Courses

FINC 201 Personal Finance
Credits 3. 3 Lecture Hours.
(BUSI 1307, HECO 1307) Personal Finance. Financial management problems of the individual consumer; budgeting, insurance, saving and investing, and home financing. May not be used as a finance elective.

FINC 210 Opportunities in Finance I
Credit 1. 1 Lecture Hour.
Introduction to major career paths in finance and assessment of students' aptitudes and interests with respect to these career paths.
Prerequisite: Freshman or sophomore classification in Mays Business School.

FINC 211 Opportunities in Finance II
Credit 1. 1 Lecture Hour.
Exploration of specific career competencies in various financial workplaces via lectures, practitioner presentations, and field experiences.
Prerequisites: FINC 210 and approval of instructor.

FINC 267 Introduction to Securities and Commodities Trading
Credit 1. 1 Lecture Hour.
Introduction to financial markets and the instruments that trade in them; describes how financial markets operate; compare and contrast a wide variety of common financial instruments, including debt, equity, derivatives and commodities; basic functions of real-world data sources (especially Bloomberg and the Wall Street Journal); and career paths in the field of finance.
Prerequisite: Freshman or sophomore classification in business.
FINC 341 Business Finance  
Credits 3.3 Lecture Hours.  
Financial practices and financial management of modern business corporations; cash flow, planning, procurement of funds, management of long-term funds and working capital.  
Prerequisite: Admission to upper division in Mays Business School.  
FINC 350 Ethics in Financial Decision-Making  
Credit 1.1 Lecture Hour.  
Recognition and avoidance of breaches of fiduciary duty in the financial workplace; integration of classical ethical codes of conduct into professional decision-making; analysis and application of practitioner standards of conduct.  
Prerequisites: Admission to upper division in Mays Business School; FINC majors only.  
FINC 351 Investment Analysis  
Credits 3.3 Lecture Hours.  
Operation and functions of the organized security exchanges, fundamental security analysis and technical market analysis.  
Prerequisite: ACCT 315 or ACCT 327, or concurrent enrollment; FINC 341 with a grade of C or better; SCMT 303 or concurrent enrollment, or AP STAT 301 or AP STAT 302 or AP STAT 303.  
FINC 361 Managerial Finance I  
Credits 3.3 Lecture Hours.  
Managerial problems of financial managers; financial analysis, current asset management, capital budgeting and capital structure.  
Prerequisite: ACCT 315 or ACCT 327, or concurrent enrollment; FINC 341 with a grade of C or better; SCMT 303 or concurrent enrollment, or AP STAT 301 or AP STAT 302 or AP STAT 303.  
FINC 368 Trade Floor Dynamics  
Credits 3.3 Lecture Hours.  
Analysis of trade floor activities and behaviors; organizational and process structure of trade floors; characteristics of trade floors that vary by type of asset traded, trading objectives and contract structure; analysis of operational issues including credit constraints, trade strategies, and regulatory compliance.  
Prerequisites: FINC 341 or concurrent enrollment; admission to Trading, Risk and Investment Program (TRIP).  
FINC 371 Real Estate Decision-Making  
Credits 3.3 Lecture Hours.  
Legal, physical and economic characteristics of real estate; overview of real estate market analysis, real estate valuation procedures and real estate production, marketing and financing methods.  
Prerequisite: FINC 341 or concurrent enrollment in FINC 341.  
FINC 381 Money and Capital Markets  
Credits 3.3 Lecture Hours.  
Role of finance and financial institutions in the money and capital markets in the U.S. including supply of and demand for funds, interest rates and flow of funds analysis.  
Prerequisite: FINC 341 with a grade of C or better.  
FINC 409 Survey of Finance Principles  
Credits 3.3 Lecture Hours.  
Finance survey for non-business majors; financial markets, the investment banking process, interest rates, financial intermediaries and the banking system, financial instruments, time value of money concepts, security valuation and selection, and international finance. May not be used to satisfy degree requirements for majors in business or agribusiness.  
Prerequisites: Junior or senior classification; for students other than business and agribusiness.  
FINC 422 Applied Investment Analysis  
Credits 3.3 Lecture Hours.  
Theoretical and analytical developments in security selection and portfolio management; includes macroeconomic analysis, portfolio theory, and portfolio performance evaluation; concepts applied to the allocation of investments in a student-managed equity portfolio.  
Prerequisites: Approval of instructor; FINC 351 and FINC 361.  
FINC 423 Options and Financial Futures  
Credits 3.3 Lecture Hours.  
Valuation of options and financial futures; risk management and hedging applications using options and financial futures; primary focus on stock options, index options, stock index futures, interest rate futures, foreign exchange futures and futures options.  
Prerequisite: FINC 351 and FINC 361.  
FINC 424 Trading Risk Management  
Credits 3.3 Lecture Hours.  
Mid-office risk management strategies using the energy markets as a focus; develops understanding of commodity market behavior, use of forwards and options for risk management, risk management reporting, Greeks and simulation-based VaR analysis.  
Prerequisite: FINC 351 and FINC 361.  
FINC 425 Active Portfolio Management  
Credits 3.3 Lecture Hours.  
Analysis of investment tactics designed to earn abnormal returns; identification and evaluation of active strategies that exploit capital market anomalies and market inefficiencies; portfolio structuring, stock and sector selection, performance measurement, attribution analysis and benchmarks in inefficient markets.  
Prerequisite: FINC 351 and FINC 361.  
FINC 426 Trading Markets  
Credits 3.3 Lecture Hours.  
Issues related to securities trading and securities markets; why and how people trade; the operation, structure and regulation of securities markets; focus on equity markets; comparisons to the markets for derivatives and other securities.  
Prerequisite: FINC 351 and FINC 361.  
FINC 427 Titans of Investing  
Credits 3.3 Lecture Hours.  
Readings from the most influential theorists and practitioners of 20th and 21st century investing; case studies and portfolio sector exercises in an institutional context, based on detailed assessment of global investment risks.  
Prerequisites: FINC 341 or FINC 409, or concurrent enrollment in either course; approval of instructor.  
FINC 428 Fixed Income Analysis  
Credits 3.3 Lecture Hours.  
Characteristics of fixed income securities including Treasury issues, federal agency issues, corporate and municipal bonds, mortgage-backed and asset-backed securities; institutional features fixed income markets; risks of bond investing; fixed income valuation; term structure; trade strategies; modeling and assessing credit risks; hedging with fixed income derivatives.  
Prerequisites: FINC 351 and FINC 361.  
FINC 435 Managerial Finance II  
Credits 3.3 Lecture Hours.  
Case studies in the administration of the financial affairs of business enterprises; working capital management, capital budgeting, capital structure, and mergers and acquisitions.  
Prerequisite: FINC 351 and FINC 361.
FINC 443 Valuation
Credits 3. 3 Lecture Hours.
Theory and application of various approaches to corporate valuation; measuring and managing the value of companies; principles of value creation; fundamental valuation methodology; application of value creation principles to managerial problems; special cases and complex valuation issues.
Prerequisites: FINC 351 and FINC 361.

FINC 445/IBUS 446 International Finance
Credits 3. 3 Lecture Hours.
International business transactions, balance of payments and exchange rate systems, exchange rate risk and hedging techniques, sources of funding, relation to international financial institutions and capital instruments; foreign direct investment; international asset and liability management.
Prerequisite: FINC 351 and FINC 361.
Cross Listing: IBUS 446/FINC 445.

FINC 446 Technical Analysis of Financial Markets
Credits 3. 3 Lecture Hours.
Use of price, volume and other non-fundamental, market and behavioral data to analyze and predict security prices; emphasis on pattern recognition and correlation analysis over theory and casual analysis; application of technical analysis as an investment discipline for institutional portfolio management; principles, terminology, techniques and emerging theories of technical analysis.
Prerequisites: FINC 351 and FINC 361.

FINC 447/ACCT 447 Financial Statement Analysis
Credits 3. 3 Lecture Hours.
Development of an analytical approach to financial statements, integrating relevant finance and accounting concepts and principles; current topics in financial analysis.
Prerequisite: FINC 341 with a grade of C or better; ACCT 315 or ACCT 327.
Cross Listing: ACCT 447/FINC 447.

FINC 448 Advanced Investments
Credits 3. 3 Lecture Hours.
Application of finance theory to complex investment problems; implementation of asset pricing models, portfolio theory and arbitrage strategies; implication of principles of market efficiency and behavioral finance for selection of individual securities and portfolios.
Prerequisites: FINC 351 and FINC 361.

FINC 449 Financial Modeling
Credits 3. 3 Lecture Hours.
Computer-based modeling of contemporary problems in investments and corporate finance including asset pricing, portfolio optimization, valuation, capital budgeting, cost of capital, risk assessment, and option pricing; using models to evaluate financial decision variables and alternative investment strategies.
Prerequisites: FINC 351 and FINC 361.

FINC 462 Commercial Bank Management
Credits 3. 3 Lecture Hours.
Problems confronting commercial banks: development and application of credit standards, decisions on loan applications, liquidity management and profit sensitivity to varying levels of interest rates.
Prerequisite: FINC 381 or concurrent enrollment.

FINC 463 Seminar in Commercial Banking
Credits 3. 3 Lecture Hours.
Cases and problems on contemporary management challenges and problem-solving techniques in commercial banks.
Prerequisite: Junior or senior classification and approval of instructor.

FINC 465 Seminar in Investment Banking
Credits 3. 3 Lecture Hours.
Cases and problems on fundamentals of valuing publicly and privately held firms, underwriting public and private offerings of debt and equity securities, managing capital market risks, complying with SEC and NASD regulations and managing other financial services commonly offered by investment banks.
Prerequisite: Junior or senior classification and approval of instructor.

FINC 466 Wall Street, Investment Banking and the Financial Markets
Credits 3. 3 Lecture Hours.
Experience, first-hand, the major financial markets of the United States; visits to major Wall Street firms, security and commodity exchanges, and other financial institutions.
Prerequisites: FINC 351 and FINC 361 and approval of instructor.

FINC 472 Real Estate Finance
Credits 3. 3 Lecture Hours.
Real estate financing instruments, institutions and techniques; trust deed financing, mortgage underwriting and risk analysis, primary and secondary mortgage markets and institutions.
Prerequisite: FINC 351, FINC 361 and FINC 371.

FINC 473 Real Estate Appraisal
Credits 3. 3 Lecture Hours.
Impact of socio-economic forces on urban real estate values; cost, sales comparison and capitalized income approaches to market value; demonstration appraisal.
Prerequisite: FINC 351, FINC 361 and FINC 371.

FINC 475 Real Estate Investment Analysis
Credits 3. 3 Lecture Hours.
Real estate market analysis, equity investor decision criteria, institutional investment constraints and investment valuation; case analysis of specific real estate investment decisions.
Prerequisite: FINC 351 and FINC 361.

FINC 484 Professional Internship
Credits 1 to 6. 1 to 6 Other Hours.
Professional internship with practicing professionals under the direction of a faculty member. Available for free elective only and must be taken on a satisfactory/unsatisfactory basis.
Prerequisites: Finance major and approval of instructor and department head.

FINC 485 Directed Studies
Credits 1 to 3. 1 to 3 Other Hours.
Directed study on selected problems in the area of finance not covered in other courses.
Prerequisites: Finance major and senior classification; approval of department head.

FINC 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected area in finance. May include attention to aspects of real estate finance, corporate financial management, investments, or financial institutions and markets.
Prerequisites: Admission to upper division in Mays Business School and approval of instructor.
FINC 601 Financial Analysis Practicum
Credits 1 to 6. 1 to 6 Lecture Hours. 1 to 6 Other Hours.
Application of finance theory to careers in finance; development of practical skills for finance professionals, including proficiency with industry-standard software, databases and analytic products; operational, legal and ethical aspects of the financial industry; financial career planning. May be taken two times for credit.
Prerequisite: Enrollment limited to FINC Classification 7 students.

FINC 602 Corporate Finance
Credits 3. 3 Lecture Hours.
Theoretical development of principles of corporate financial management; application of principles to problems faced by financial officers, such as capital budgeting, cost of capital, capital structure, dividend policy, financial distress and corporate valuation.
Prerequisite: Enrollment limited to FINC Classification 6 students.

FINC 603 Investments
Credits 3. 3 Lecture Hours.
Theoretical development and application of principles of investment management; topics include measuring risk aversion, portfolio optimization, factor models, asset pricing models, bond pricing, term structure of interest rates, bond portfolio management and equity valuation.
Prerequisite: Enrollment limited to MS in FINC students.

FINC 604 Fixed Income Securities
Credits 3. 3 Lecture Hours.
Economics and institutional analysis of bond markets and determinants of interest rates for bonds, including Treasury issues, federal agency issues, corporate bonds, municipal bonds, mortgage-backed and asset-backed securities; features of fixed income securities from microeconomic and macroeconomic perspectives; analysis of risk and return, valuation, term structure, trading strategies and credit risk.
Prerequisite: FINC 602 and FINC 603 or approval of Department Head.

FINC 605 Valuation and Financial Modeling
Credits 3. 3 Lecture Hours.
Principles of value creation; definition of fundamental value, market value and replacement value; differences between well-established valuation approaches; applications to measuring the value of business organizations using rigorous applications of financial theory and accounting principles.
Prerequisite: FINC 602, FINC 603 and ACCT 610 or approval of Department Head.

FINC 612 Finance for the Professional
Credits 1 to 4. 1 to 4 Lecture Hours.
Focuses on investment and financing decisions in corporate firms. Emphasizes principles, techniques and applications in corporate finance, including: risk and return, capital budgeting, discounted cash flow valuation, capital structure, and payout policy. Classification 6 students may not enroll in this course. Please note this is changing to a variable credit course.
Prerequisite: ACCT 610 or equivalent. Enrollment is limited to BUAD classification 7.

FINC 613 Finance for the Professional II
Credits 1 to 3. 1 to 3 Lecture Hours.
Focus on advanced topics in domestic and international finance; analysis of dividend, capital structure and refinancing decisions; exposure to financial derivatives; foreign exchange rate determination and risk management.
Prerequisite: FINC 612. Enrollment is limited to BUAD classification 7.

FINC 629 Financial Management I
Credits 3. 3 Lecture Hours.
Analysis of finance function, credit and equity markets, financing and dividend decisions; mechanics of financial analysis. Classification 6 students may not enroll in this course.
Prerequisites: FINC 612 or FINC 635; ACCT 610 or ACCT 640.

FINC 630 Financial Management II
Credits 3. 3 Lecture Hours.
Basic concepts of finance applied to solution of business problems using case studies; financial analysis skills further developed and refined; investment and financing decisions analyzed. Classification 6 students may not enroll in this course.
Prerequisite: FINC 629.

FINC 632 Investment Management
Credits 3. 3 Lecture Hours.
Introductory course in investments; nature and functioning of securities markets; various investment media and tools for analysis of these media; analysis of debt and equity securities. Alternative trading strategies evaluated. Classification 6 students may not enroll in this course.
Prerequisite: FINC 612 or FINC 635.

FINC 635 Financial Management for Non-Business
Credits 3. 3 Lecture Hours.
External and internal factors affecting financial decision-making in the firm; fundamental concepts of accounting and managerial economics.
Prerequisite: ACCT 640 or equivalent or approval of instructor.

FINC 641 Valuation
Credits 3. 3 Lecture Hours.
Theory and application of various approaches to valuation; measuring and managing the value of corporations; principles of value creation; fundamental valuation methodology; application of value creation principles to managerial problems; special cases and complex valuation issues.
Prerequisites: ACCT 229 or ACCT 610 or ACCT 640; FINC 351 or FINC 632; FINC 361 or FINC 629.

FINC 642 Analysis of Money and Capital Markets
Credits 3. 3 Lecture Hours.
U.S. money and capital markets; changes in supply of and demand for money and capital as they influence the policies of financial intermediaries, fiscal and monetary authorities and nonfinancial firms. Interest rates; factors affecting their level and structure; flow of funds in the U.S. economy. Classification 6 students may not enroll in this course.
Prerequisite: FINC 612 or FINC 635.

FINC 643 Commercial Bank Management
Credits 3. 3 Lecture Hours.
Financial management problems of commercial bank management including raising funds, investing funds and making loans; nontraditional bank activities; emphasis on actual case situations. Classification 6 students may not enroll in this course.
Prerequisite: FINC 642.

FINC 644 Funding New Ventures
Credits 3. 3 Lecture Hours.
Introduction to the general phenomena of small business and entrepreneurship; central focus provides students an understanding of entrepreneurship and the financing of entrepreneurial ventures; addresses the types of financing available at different stages of the new venture. Classification 6 students may not enroll in this course.
FINC 645/IBUS 645 International Finance
Credits 3.3 Lecture Hours.
Problems confronted by financial managers of firms with international business operations; international money and capital markets; exchange rate risks and political risks. May be repeated for up to 3 hours credit. Classification 6 students may not enroll in this course.
Prerequisite: FINC 612 or FINC 635.
Cross Listing: IBUS 645/FINC 645.

FINC 646 Technical Analysis of Financial Markets
Credits 3.3 Lecture Hours.
Use of price, volume and other non-fundamental, market and behavioral data to analyze and predict security prices; emphasis on pattern recognition and correlation analysis over theory and casual analysis; application of technical analysis as an investment discipline for institutional portfolio management; principles, terminology, techniques, and emerging theories of technical analysis.
Prerequisites: FINC 612 or FINC 635; ACCT 610 or ACCT 640.
Cross Listing: ACCT 647/FINC 647.

FINC 648 Advanced Investments
Credits 3.3 Lecture Hours.
Application of finance theory to complex investment problems; implementation of asset pricing models, portfolio theory and arbitrage strategies; implications of principles of market efficiency and behavioral finance for selection of individual securities and portfolios.
Prerequisites: FINC 351 or FINC 632; FINC 361 or FINC 629.

FINC 649 Financial Modeling
Credits 3.3 Lecture Hours.
Computer-based modeling of contemporary problems in investments and corporate finance including asset pricing, portfolio optimization, valuation, capital budgeting, cost of capital, risk assessment, and option pricing; using models to evaluate financial decision variables and alternative investment strategies.
Prerequisites: Graduate classification; classification 6 students may not enroll in this course; FINC 421 or FINC 632; FINC 434 or FINC 629.

FINC 660 Fixed Income Analysis
Credits 3.3 Lecture Hours.
Characteristics of fixed income securities including Treasury issues, federal agency issues, corporate and municipal bonds, mortgage-backed and asset-backed securities; institutional features fixed income markets; risks of bond investing; fixed income valuation; term structure; trade strategies; modeling and assessing credit risks; hedging with fixed income derivatives.
Prerequisites: Graduate classification; classification 6 students may not enroll in this course; FINC 421 or FINC 632; FINC 434 or FINC 629.

FINC 661 Trading Risk Management
Credits 3.3 Lecture Hours.
Focuses on Mid-office risk management strategies using the energy markets as a focus; develops understanding of commodity market behavior, use of forwards and options for risk management, risk management reporting, Greeks and simulation-based VaR analysis. Classification 6 students may not enroll in this course.
Prerequisite: FINC 632.

FINC 663 Trading and Markets
Credits 3.3 Lecture Hours.
Issues relating to securities trading and securities markets; discusses why and how people trade, and the operation, structure, and regulation of securities markets; focus on equity markets; comparisons to the markets for derivatives and other securities. Classification 6 students may not enroll in this course.
Prerequisite: FINC 632.

FINC 664 Active Portfolio Management
Credits 3.3 Lecture Hours.
Analysis of investment tactics designed to earn abnormal returns; identification and evaluation of active strategies that exploit market anomalies and market inefficiencies; portfolio structuring, stock and sector selection, performance measurement, attribution analysis and benchmarks in inefficient markets.
Prerequisites: Graduate classification; classification 6 students may not enroll in this course; FINC 421 or FINC 632; FINC 434 or FINC 629.

FINC 665 Derivative Securities
Credits 3.3 Lecture Hours.
Valuation of financial forward contracts, futures contracts and basic options; course covers valuation and behavior of interest rate and exchange rate forward curves, fixed-for-floating transactions, stock options, and index-based-options. Classification 6 students may not enroll in this course.
Prerequisite: FINC 632.

FINC 666 Wall Street, Investment Banking and the Financial Markets
Credits 3.3 Lecture Hours.
Provides students an opportunity to visit Wall Street and the heart of U.S. financial and security markets; focuses on visits to Wall Street firms and interaction with financial market professionals. Classification 6 students may not enroll in this course.
Prerequisite: Approval of instructor.

FINC 668 Applied Investment Analysis
Credits 3.3 Lecture Hours.
Theoretical and analytical developments in security selection and portfolio management; includes macroeconomic analysis, portfolio theory, and portfolio performance evaluation; concepts applied to the allocation of investments in a student-managed equity portfolio. Classification 6 students may not enroll in this course.
Prerequisites: FINC 632 and approval of instructor.

FINC 669 Titans of Investing
Credits 3.3 Lecture Hours.
Readings from the most influential theorists and practitioners of 20th and 21st century investing. Case studies and portfolio sector exercises in an institutional context, based on detailed assessment of global investment risks. Classification 6 students may not enroll in this course.
Prerequisite: Approval of instructor.

FINC 670 Real Property Analysis
Credits 3.3 Lecture Hours.
Provides the economic and financial tools used to analyze real estate investments, new property developments and the redevelopment of existing properties. Classification 6 students may not enroll in this course.
Prerequisite: Graduate classification.
FINC 672 Real Property Finance
Credits 3.3 Lecture Hours.
Primary and secondary mortgage markets; mortgage markets’ institutional organization, alternative mortgage instruments, creative financing techniques, loan underwriting factors and risk hedging strategies. Classification 6 students may not enroll in this course.
Prerequisites: FINC 612 or FINC 635; FINC 670.

FINC 673 Real Property Valuation I
Credits 3.3 Lecture Hours.
Procedures used to estimate market value of real property; market analysis and valuation techniques most appropriate for appraising income-producing properties; demonstration appraisal report. Classification 6 students may not enroll in this course.
Prerequisites: FINC 612 or FINC 635; FINC 670; enrollment in MRE program.

FINC 674 Real Property Valuation II
Credits 3.3 Lecture Hours.
Provides opportunity to develop advanced competencies in analysis and valuation of more complex assignments and properties; draws upon previous coursework in land economics and real estate program including real property valuations, market analysis, real estate investment analysis and real property finance. Classification 6 students may not enroll in this course.
Prerequisites: Enrollment in MRE program; FINC 670.

FINC 675 Analysis of Real Estate Investment Decisions
Credits 3.3 Lecture Hours.
Analytical techniques for real estate investment decision-making which emphasize the importance of income tax considerations, the magnitude of relevant cash flows and the timing of both; case histories used to analyze investment problems. Classification 6 students may not enroll in this course.
Prerequisite: FINC 612 or FINC 635.

FINC 676 Commercial Real Estate Law
Credits 3.3 Lecture Hours.
Commercial real estate law including legal ownership interests in oil and gas law, real estate sales contacts, financing, instruments and closings, commercial leases and real estate regulations and taxation. Classification 6 students may not enroll in this course.
Prerequisite: Graduate classification.

FINC 677 Real Estate Development Analysis
Credits 3.3 Lecture Hours.
Financial aspects of real estate development; project investment characteristics and merits. Classification 6 students may not enroll in this course.
Prerequisites: FINC 612 or FINC 635; enrollment in MRE program.

FINC 684 Professional Internship
Credits 1 to 6.1 to 6 Other Hours.
A directed internship in an organization to provide students with on-the-job training with professionals in organizational settings appropriate to the student's professional objectives. Classification 6 students may not enroll in this course.
Prerequisites: Approval of committee chair and department head.

FINC 685 Directed Studies
Credits 1 to 4.1 to 4 Other Hours.
Directed study of selected problems using recent developments in business research methods. Classification 6 students may not enroll in this course.
Prerequisites: Graduate classification and approval of instructor.

FINC 688 Doctoral Seminar
Credits 3.3 Other Hours.
Historical development of the conceptual framework of finance theory and practices; analysis of current research and controversial issues in the field. For doctoral students only. Classification 6 students may not enroll in this course. May be repeated for credit.
Prerequisite: Doctoral classification.

FINC 689 Special Topics in...
Credits 1 to 4.1 to 8 Lecture Hours.
Selected topics in an identified area of finance. May be repeated for credit. Classification 6 students may not enroll in this course.

FINC 690 Theory of Research in Finance
Credits 3.3 Lecture Hours.
Design of research in various subfields of finance and the evaluation of research results using examples from the current research literature. May be repeated for credit. Classification 6 students may not enroll in this course.
Prerequisite: Doctoral classification.

FINC 691 Research
Credits 1 to 23.1 to 23 Other Hours.
Research for thesis or dissertation. Classification 6 students may not enroll in this course.
Prerequisite: Doctoral classification.

FIVS - Forensic & Inv Science

Courses

FIVS 123 Forensic Investigations
Credits 3.3 Lecture Hours.
Overview of forensics from incident scene to court room verdict; principles, concepts, tools and methodologies used in the science and practice of forensics; examination of various forensic fields; evidence recognition, analysis, interpretation and presentation to diverse audiences.

FIVS 205 Introduction to Forensic and Investigative Sciences
Credits 3.3 Lecture Hours.
(FORS 2440) Introduction to Forensic and Investigative Sciences. Overview of principles, procedures, and concepts of forensic and investigative sciences; instruction in the definitions, scope, and use of tools, techniques and protocols in forensic applications used to resolve social, regulatory, and legal disputes.
Prerequisite: Freshman or sophomore classification or approval of instructor.

FIVS 285 Directed Studies
Credits 1 to 4.0 to 4 Lecture Hours. 0 to 4 Lab Hours. 0 to 4 Other Hours.
Directed individual study in forensic and investigative sciences. May be repeated for credit.
Prerequisites: Freshman or sophomore classification; approval of instructor and department head.

FIVS 289 Special Topics in...
Credits 1 to 4.1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of forensic and investigative sciences. May be repeated for credit.

FIVS 291 Research
Credits 1 to 4.1 to 12 Lab Hours.
Research conducted under the direction of a faculty member in the department of entomology. May be repeated 3 times for credit.
Prerequisite: Freshman or sophomore classification.
FIVS 308 Forensic Implications of Inheritance
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Forensic genetics with an emphasis on human molecular genetics, population genetics, and genetic application in the forensic sciences.
Prerequisites: BIOL 112; upper division in forensic and investigative sciences; junior or senior classification.

FIVS 316 Biotechnology and Forensics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Introduction of applications of biotechnology for agriculture and human health purposes; description of experimental protocols used to create genetically modified organisms (GMOs); discussion of the risks, benefits, and regulations controlling the use of biotechnology in society.
Prerequisites: GENE 301 or GENE 310 or FIVS 308 or approval of instructor.

FIVS 401/SCSC 401 Forensic Soil Science
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Examination of soils biology, chemistry and physical attributes to solve crimes; soil and geologic characteristics associated with crime scene examination; physical, biological and chemical characteristics and use of trace evidence.
Prerequisite: Junior or senior classification.
Cross Listing: SCSC 401/FIVS 401.

FIVS 415 Practice and Principles of Science and Law
Credits 3. 3 Lecture Hours.
Introduction to series of practitioners of forensic science and the justice system; receive instruction on principles, procedures, and practices used in solving legal and societal issues; examine scientific method and scientific knowledge as applied through expert testimony; enhance critical thinking and reasoning skills in studying and debating different positions of current issues of science and law.
Prerequisites: FIVS 205, FIVS 431/ENTO 431 and FIVS 432/ENTO 432; senior classification or approval of instructor; concurrent enrollment with FIVS 435.

FIVS 421 Latent Print Processing
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Information, techniques, and methodologies for processing latent fingerprints and enhancing visible fingerprints at and from crime scenes, as well as from physical evidence.
Prerequisites: FIVS 205, upper division forensic and investigative sciences academic standing, and approval of instructor.

FIVS 422 Crime Scene Investigation
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Principles, procedures, processes and hands-on experience for conducting investigations ranging from general crime scene to death investigations.
Prerequisites: FIVS 205, upper division forensic and investigative sciences academic standing, and approval of instructor.

FIVS 431/ENTO 431 The Science of Forensic Entomology
Credits 3. 3 Lecture Hours.
Explores the science, methodology and technology employed to gather, preserve, and present information about insects and other arthropods in such a manner that this information can be used in courts of law as evidence and testimony to help resolve issues of a criminal or civil nature.
Prerequisites: Junior classification or approval of instructor.
Cross Listing: ENTO 431/FIVS 431.

FIVS 432/ENTO 432 Applied Forensic Entomology
Credit 1. 3 Lab Hours.
Laboratory-based course affording practical experience using scientific information, methodology, technology, and legal procedures inherent to the field of forensic entomology; emphasis on collecting, preserving, and identifying information as evidence and expert witness testimony in courts of law.
Prerequisites: Concurrent enrollment with FIVS 431/ENTO 431; junior classification or approval of instructor.
Cross Listing: ENTO 432/FIVS 432.

FIVS 435 Case Studies in Problem Solving
Credits 3. 3 Lecture Hours.
Development of reasoning strategies by examining a variety of case studies; science and scientific method solving real-world problems as part of an investigative team.
Prerequisite: Senior classification or approval of instructor; concurrent enrollment with FIVS 415.

FIVS 481 Seminar
Credit 1. 1 Lecture Hour.
Analysis of research topics related to the fields of forensic science and law. May be taken 4 times for credit.
Prerequisite: Junior or senior classification or approval of instructor.

FIVS 482 Occupational and Professional Development
Credits 2. 2 Lecture Hours.
Organized instruction in written and oral communication; acquaint students with private and public-sector companies and agencies as well as leading professionals from these firms to reinforce academic instruction and prepare students for the transition to employment, graduate and professional schools.
Prerequisite: Junior or senior classification or approval of instructor.

FIVS 484 Professional Internship
Credits 1 to 4. 1 to 12 Lab Hours.
Independent study and supervised field experience related to a professional area or interest in forensic science. May be taken 3 times for credit.
Prerequisite: Junior or senior classification or approval of instructor.

FIVS 485 Directed Studies
Credits 1 to 4. 1 to 4 Lecture Hours.
Directed individual study in forensic and investigative sciences. May be repeated for credit.
Prerequisites: Junior or senior classification; upper-division FIVS only; approval of instructor and department head.

FIVS 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of forensic and investigative sciences. May be repeated for credit.

FIVS 491 Research
Credits 1 to 4. 1 to 12 Lab Hours.
Research conducted under the direction of a faculty member in the department of entomology. May be repeated 3 times for credit.
Prerequisite: Junior or senior classification.
Courses

FREN 101 Beginning French I
Credits 4. 3 Lecture Hours. 2 Lab Hours.
(FREN 1411, 1511) Beginning French I. Elementary language study with oral, written, and reading practice. Preparation for conversation. Part of class preparation will be done in language laboratory.

FREN 102 Beginning French II
Credits 4. 3 Lecture Hours. 2 Lab Hours.
(FREN 1412, 1512) Beginning French II. Continuation of FREN 101. Part of class preparation will be done in language laboratory.
Prerequisite: FREN 101.

FREN 201 Intermediate French I
Credits 3. 3 Lecture Hours.
Prerequisite: FREN 102.

FREN 202 Intermediate French II
Credits 3. 3 Lecture Hours.
(FREN 2312) Intermediate French II. Continuation of FREN 201 with more advanced material.
Prerequisite: FREN 201.

FREN 221 Field Studies I
Credits 3. 3 Other Hours.
French language and culture taught in France; supervised travel of cultural interest; living with local families; participation in the activities and courses of a French university or institute; written and oral reports, exams; to be taken concurrently with FREN 222.
Prerequisite: FREN 202 with a grade of B or higher or approval of instructor.

FREN 222 Field Studies II
Credits 3. 3 Other Hours.
French language and literature taught in France in cooperation with a French university or institute; exams, written reports; to be taken concurrently with FREN 221.
Prerequisite: FREN 202 with a grade of B or higher or approval of instructor.

FREN 223/EURO 223 French Culture and Society in French Literary Masterpieces in Translation
Credits 3. 3 Lecture Hours.
Analysis and understanding of French culture and contemporary society through the study of masterpieces of French literature including novels, plays, short stories and films.
Cross Listing: EURO 223/FREN 223.

FREN 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Individual supervision of readings or assigned projects in French, selected for each student individually.
Prerequisite: Approval of instructor and department head.

FREN 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of French. May be repeated for credit.
Prerequisite: Approval of instructor.

FREN 300 Composition
Credits 3. 3 Lecture Hours.
Development of writing skills in French; emphasis on grammatical constructions; structural analysis of representative texts and their imitation; expression of hypotheses; descriptive and explanatory writing; required for modern languages majors in French; conducted in French.
Prerequisite: FREN 202 or FREN 222.

FREN 301 French Culture and Civilization
Credits 3. 3 Lecture Hours.
Cultural background of French language and literature; salient aspects of the geography and history of France; characteristic elements of French culture; illustration of major stylistic periods in literature and the fine arts; conducted in French.
Prerequisite: FREN 202 or FREN 222.

FREN 306 Technical and Business French
Credits 3. 3 Lecture Hours.
Advanced-intermediate course to provide cross-cultural communication skills crucial to succeeding in a francophone business or technical environment, including topics on business and technical jargon, correspondance, résumés, interviewing, the European Union, telecommunications, technology and the French-speaking community.
Prerequisite: FREN 202 or FREN 222 or approval of instructor.

FREN 311 Advanced Oral Expression
Credits 3. 3 Lecture Hours.
Strategies for effective communication in spoken French with special attention to language appropriate to various social contexts; analysis of press articles, television and radio programs; oral presentations; conducted in French.
Prerequisite: FREN 202 or FREN 222.

FREN 321 Survey of French Literature I
Credits 3. 3 Lecture Hours.
Masterpieces of French poetry, prose and theater from the Middle Ages through the seventeenth century, with special attention to the place of each work’s significance to the evolution of French society and culture; conducted in French.
Prerequisite: FREN 202 or FREN 222.

FREN 322 Survey of French Literature II
Credits 3. 3 Lecture Hours.
Masterpieces of French poetry, prose and theater from the Enlightenment through the twentieth century, with special attention to the place of each work’s significance to the evolution of French society and culture; conducted in French.
Prerequisite: FREN 202 or FREN 222.

FREN 336 Contemporary France
Credits 3. 3 Lecture Hours.
Cultural, economic and political aspects of present-day French society, including educational institutions, modern families, gender roles, entertainment and leisure, social classes and lifestyles, French and American cultural differences, and treatment of these issues in French media; conducted in French.
Prerequisite: FREN 202 or FREN 222.

FREN 410 Seminar in French Literature
Credits 3. 3 Lecture Hours.
Exploration of a significant topic or period in French literature; conducted in French. May be repeated for credit.
Prerequisites: FREN 300 and an additional 3 hours at 300-level.
FREN 418 Seminar in French Civilization
Credits 3. 3 Lecture Hours.
Discussions and observation of particular events and institutions crucial to the development of French society and culture; analysis of literary, artistic and cinematic representations of events and phenomena such as the French revolution, May 1968, and church and state relations; conducted in French. May be repeated for credit.
Prerequisites: FREN 300 and an additional 3 hours at 300-level.
FREN 422/WGST 422 Studies in Gender and French Literature
Credits 3. 3 Lecture Hours.
The role of gender in the production, dissemination, reception and interpretation of literary texts in the French tradition, including continental France as well as the Francophone literatures of West Africa, Canada, and elsewhere; taught in English.
Prerequisite: FREN 202 or approval of instructor.
Cross Listing: WGST 422/FREN 422.
FREN 425/FILM 425 French Film
Credits 3. 3 Lecture Hours.
Overview of French cinema from its origins to the present; interpretation of French cultural history and politics through film; taught in English.
Prerequisites: Junior or senior classification, or approval of instructor.
Cross Listing: FILM 425/FREN 425.
FREN 475 The Francophone World
Credits 3. 3 Lecture Hours.
The peoples, cultures and societies of French-speaking communities outside of France, with special attention to their colonial origins and current issues of politics, identities and migrations as represented in works of film and literature.
Prerequisite: FREN 202 or equivalent; junior or senior classification.
FREN 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Individual supervision of readings or assigned projects, selected for each student individually; written and oral reports.
Prerequisite: Approval of instructor and department head.
FREN 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of French. May be repeated for credit.
Prerequisite: Approval of instructor.
FREN 491 Research
Credits 1 to 3. 1 to 3 Other Hours.
Research conducted under the direction of faculty member in French. May be taken three times for credit.
Prerequisites: Junior or senior classification and approval of department head.
FREN 601 Introduction to Scientific French
Credits 3. 3 Lecture Hours.
Intensive course to prepare graduate students to read scientific material; technical vocabulary and translation. May not count for hours in a supporting field.
Prerequisite: Graduate classification.
FREN 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed individual study of selected problems in the field of French.
Prerequisite: Approval of instructor.
FREN 689 Special Topics in...
Credits 3. 3 Lecture Hours.
Selected topics in an identified area of French. May be repeated for credit.
Prerequisite: Approval of instructor.

FREN 692 Readings
Credits 3. 3 Lecture Hours.
Readings in French literary texts in the original language.
Prerequisite: Graduate classification.
FRSC - Forest Science

Courses
FRSC 420 Arboriculture
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Tree selection and planting to fit climatic, space and edaphic conditions; diagnosing tree abnormalities and practicing intensive tree care. Frequent field work and demonstrations.
Prerequisite: Senior classification or approval of instructor.*
FRSC 421 Urban Forestry
Credits 3. 3 Lecture Hours.
Conceptual role of trees in improving the urban environment; optimum use of existing forested areas and the establishment of trees in appropriate open spaces; tree ordinances, species evaluation, street tree planning and tree inventory systems.
Prerequisite: Approval of instructor.*

FSTC - Food Science & Tech

Courses
FSTC 201 Food Science
Credits 3. 3 Lecture Hours.
(AGRI 1329) Food Science. The fundamental biological, chemical and physical scientific principles associated with the study of foods; topics include food composition and nutrition, food additives and regulations, food safety and toxicology, food processing, food engineering, food biotechnology, product development and sensory evaluation.
FSTC 210/NUTR 210 Horizons in Nutrition and Food Science
Credits 2. 2 Lecture Hours.
Introduction to nutrition and food science career opportunities through presentations by nutrition and food science researchers and industry professionals; addresses issues of professionalism including portfolio development, teamwork, and critical thinking skills.
FSTC 285 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Directed study of selected problems in the area of food science.
Prerequisites: Approval of instructor; 2.0 GPR in major and overall.
FSTC 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Special Topics in... Selected topics in an identified area of food science and technology. May be repeated for credit.
Prerequisite: Approval of instructor.
FSTC 291 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in food science and technology. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of department head.
FSTC 300/NUTR 300 Religious and Ethnic Foods
Credits 3. 3 Lecture Hours.
Understanding religious and ethnic foods with application to product development, production, and nutritional practices; emphasis on different food rules and priorities with attention given to different religious and ethnic groups within the US and around the world.
Prerequisites: Junior or senior classification or approval of instructor; basic knowledge of food science and nutrition helpful.
Cross Listing: NUTR 300/FSTC 300.

FSTC 305 Fundamental Baking
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Fundamentals of baking; chemical and physical properties of ingredients, methods of baking all products, fundamental reactions of dough, fermentation and oven baking.
Prerequisite: CHEM 222 or 227 or approval of department head.

FSTC 307/ANSC 307 Meats
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Integrated studies of the meat animal processing sequence regarding the production of meat-type animals and the science and technology of their conversion to human food.
Prerequisites: ANSC 107 and 108 or approval of department head.

FSTC 311/HORT 311 Principles of Food Processing
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Principles and practices of canning, freezing, dehydration, pickling and specialty food manufacture; fundamental concepts of various techniques of preparation, processing, packaging and use of additives; processing plants visited.
Prerequisite: FSTC 201; junior or senior classification or approval of department head or instructor.
Cross Listing: HORT 311/FSTC 311.

FSTC 312/DASC 312 Food Chemistry
Credits 3. 3 Lecture Hours.
The fundamental and relevant chemistry and functionality of the major food constituents (water, carbohydrates, lipids, proteins, phytochemical nutraceuticals) and study of food emulsion systems, acids, enzymes, gels, colors, flavors and toxins.
Prerequisite: FSTC 201; CHEM 227; CHEM 237 or approval of department head or instructor.
Cross Listing: DASC 312/FSTC 312.

FSTC 313/DASC 313 Food Chemistry Laboratory
Credit 1. 3 Lab Hours.
Laboratory exercises investigating specific molecules, such as food acids, enzymes, pigments and flavors, and chemical interactions in foods, such as oxidation reactions, emulsion systems, and functional properties from a fundamental chemistry rather than an analytical perspective.
Prerequisite: FSTC 201; CHEM 227; CHEM 237 or approval of department head or instructor.
Cross Listing: DASC 313/FSTC 313.

FSTC 314/DASC 314 Food Analysis
Credits 3. 1 Lecture Hour. 4 Lab Hours.
Selected standard methods for assay of food components; principles and methodology of both classical and instrumental techniques in food analysis.
Prerequisite: FSTC 201; FSTC 311/HORT 311; CHEM 227; CHEM 237 or approval of department head or instructor.
Cross Listing: DASC 314/FSTC 314.

FSTC 315/AGSM 315 Food Process Engineering Technology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Elementary mechanics, power transmission, steam and steam boilers, pipes and pipe fitting, refrigeration and insulation, temperature measurement and control, electric motors, disposal of waste products, and mechanical problems as applied to foods and food processing.
Prerequisites: FSTC 201; PHYS 201; junior or senior classification or approval of instructor approval.
Cross Listing: AGSM 315/FSTC 315.

FSTC 326/DASC 326 Food Bacteriology
Credits 3. 3 Lecture Hours.
Microbiology of human foods and accessory substances. Raw and processed foods; physical, chemical and biological phases of spoilage; standard industry techniques of inspection and control.
Prerequisite: BIOL 206 or approval of instructor; junior or senior classification.
Cross Listing: DASC 326/FSTC 326.

FSTC 327/DASC 327 Food Bacteriology Lab
Credit 1. 3 Lab Hours.
Laboratory to accompany FSTC 326/DASC 326.
Cross Listing: DASC 327/FSTC 327.

FSTC 330/DASC 330 Dairy and Food Technology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Principles and practices involved in processing of milk into market milk, butter, cheese and cheese foods; fundamental principles of these processes as related to their design and control.
Cross Listing: DASC 330.

FSTC 331/DASC 331 Dairy and Food Technology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Manufacture of frozen, freeze-dehydrated, concentrated and dehydrated dairy foods; fundamental aspects of freezing, concentration and dehydration of foods.
Prerequisite: FSTC 330/DASC 330 or approval of department head.
Cross Listing: DASC 331.

FSTC 401 Food Product Development
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Design and develop food products using principles of food chemistry, food processing, nutrition, sensory analysis and statistics; team collaborate to improve food product characteristics to meet the needs of a changing society.
Prerequisites: FSTC 201, FSTC 311/HORT 311, FSTC 312/DASC 312, FSTC 313/DASC 313, FSTC 314/DASC 314, FSTC 315/AGSM 315, FSTC 326/DASC 326 or registration therein; senior classification or approval of instructor.

FSTC 405/POSC 405 Egg and Poultry Meat Processing
Credits 3. 3 Lecture Hours.
Principles of egg and poultry meat processing, understanding egg and poultry meat markets, egg and meat grading, product safety, packaging and consumer acceptance of shell eggs and poultry meat, specifically turkey and broilers.
Prerequisites: Junior or senior classification or approval of instructor.
Cross Listing: POSC 405/FSTC 405.
FSTC 406/POSC 406 Poultry Further Processing
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Science and practice of value-added products; physical, chemical, microbiological and functional characteristics of value-added poultry products as they affect consumer acceptance, efficiency of production and regulatory approval.
Prerequisites: CHEM 222; DASC 326/FSTC 326/FSTC 326/DASC 326; POSC 309; POSC 405/FSTC 405; junior or senior classification or approval of instructor.
Cross Listing: POSC 406/FSTC 406.

FSTC 410/NUTR 410 Nutritional Pharmacometrics of Food Compounds
Credits 3. 3 Lecture Hours.
Nutritional pharmacokinetics and pharmacodynamics of food compounds; specific examples of toxicological and pharmacological effects of food compounds.
Prerequisites: NUTR 202 or NUTR 203 or FSTC 201 or CHEM 222 or CHEM 227 or approval of instructor; junior or senior classification.
Cross Listing: NUTR 410/FSTC 410.

FSTC 440/NUTR 440 Therapeutic Microbiology: Probiotics and Related Strategies
Credits 3. 3 Lecture Hours.
Topics relevant to alimentary (gastrointestinal) microbiology including: (i) the "normal" intestinal microbiota; (ii) probiotic and prebiotic nutritional supplements; (iii) recombinant pharmabiotics; (iv) gut-associated lymphoid tissue and mucosal immunity; (v) foodborne gastrointestinal pathogens; and (vi) fermented products as functional foods.
Prerequisites: Undergraduate survey course in microbiology or approval of instructor; junior or senior classification.
Cross Listing: NUTR 440/FSTC 440.

FSTC 444 Fundamentals of Food Law
Credits 3. 3 Lecture Hours.
History, development of, and fundamental principles behind current food regulations, including food labeling, adulteration, food safety, food additives, dietary supplements, and import and export laws; overview of government agency jurisdiction, international law and ethics.
Prerequisite: FSTC 201; junior or senior classification.

FSTC 446/HORT 446 Commercial Fruit and Vegetable Processing
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Pilot plant and laboratory operations pertaining to processed fruits, vegetables and beverages; new product development emphasized via individual laboratory projects.
Prerequisite: FSTC 311/HORT 311.
Cross Listing: HORT 446/FSTC 446. (Offered in even numbered years.)

FSTC 457/ANSC 457 Hazard Analysis and Critical Control Point System
Credits 3. 3 Lecture Hours.
Hazard Analysis and Critical Control Point (HACCP) principles specifically related to meat and poultry; microbiological and process overviews; good manufacturing practices and standard operating procedures development.
Prerequisite: FSTC 326/DASC 326 or approval of instructor.
Cross Listing: ANSC 457/FSTC 457.

FSTC 469/NUTR 369 Experimental Nutrition and Food Science Laboratory
Credits 4. 1 Lecture Hour. 6 Lab Hours.
Investigation of nutritional intervention in animal models of metabolic and psychological disorders (e.g. obesity and depression); investigational approaches: behavioral analyses; RNA and protein analyses; reverse transcription PCR.
Prerequisites: CHEM 227; CHEM 237; junior or senior classification or approval of instructor.
Cross Listing: NUTR 369.

FSTC 471/NUTR 471 Critical Evaluation of Nutrition and Food Science Literature: Evidence Based Reviews
Credits 3. 3 Lecture Hours.
Evaluation of scientific literature, research methods within the literature, and the quality of scientific studies to produce an evidence-based review in areas specific to nutrition and food science.
Prerequisites: NUTR 202 or NUTR 203 and STAT 302; junior or senior classification; knowledge of technical writing helpful.
Cross Listing: NUTR 471/FSTC 471.

FSTC 481 Seminar
Credit 1. 1 Lecture Hour.
Guidelines and practice in journal article review and making effective technical presentations; strategies for conducting a job search; development of résumés and letters and interviewing targeted for careers in the food industry or graduate school.
Prerequisite: Senior classification in food science and technology.

FSTC 485 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Directed study on selected problems in the area of food technology not covered in other courses.
Prerequisites: Junior or senior classification; approval of department head; 2.0 GPR in major and overall.

FSTC 487/ANSC 487 Sensory Evaluation of Foods
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Application of sensory science principles and practices to food systems including an understanding of discriminative, descriptive and consumer sensory techniques.
Prerequisites: CHEM 222 or CHEM 228; junior or senior classification.
Cross Listing: ANSC 487/FSTC 487.

FSTC 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of food science and technology. May be repeated for credit.

FSTC 491 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in food science and technology. May be repeated 3 times for credit. Registration in multiple sections of this course are possible within a given semester provided that the per semester credit hour limit is not exceeded.

FSTC 605 Chemistry of Foods
Credits 3. 3 Lecture Hours.
Chemical covalent and noncovalent interactions in food systems; the glass transition and moisture in foods; carbohydrate chemistry; reactions of food lipids; food protein functionality; chemistry of flavor; processing chemistry; food additives; and nutraceutical phytochemicals.
Prerequisite: BICH 410 or BICH 603.
FSTC 606/DASC 606 Microbiology of Foods  
Credits 3. 3 Lecture Hours.  
Nature and function of beneficial and defect-producing bacteria in foods; food-borne illness, effects of processing, storage and distribution; techniques for isolation and identification from foods.  
Cross Listing: DASC 606/FSTC 606.

FSTC 607/ANSC 607 Physiology and Biochemistry of Muscle as a Food  
Credits 3. 3 Lecture Hours.  
Biochemical, histological, anatomical and physical characteristics of muscle cells and factors associated with transformation of muscle cells into meat.  
Prerequisite: BICH 410 or approval of department head.  
Cross Listing: ANSC 607/FSTC 607.

FSTC 610/NUTR 610 Nutritional Pharmacometrics of Food Compounds  
Credits 3. 3 Lecture Hours.  
Introduction into nutritional pharmacokinetics and pharmacodynamics of food compounds; specific examples of toxicological and pharmacological effects of food compounds.  
Prerequisite: NUTR 202 or NUTR 203 or FSTC 201 or CHEM 227 or CHEM 222 or instructor approval.  
Cross Listing: NUTR 610/FSTC 610.

FSTC 611/POSC 611 Poultry Further Processing  
Credits 3. 3 Lecture Hours.  
Egg and poultry meat processing; egg markets, egg processing, grading, packaging, safety, quality and consumer acceptance of shell eggs; poultry meat processing (specifically turkey and broilers), meat quality, markets, consumer acceptance of poultry meat and safety.  
Cross Listing: POSC 611/FSTC 611.

FSTC 619 Molecular Methods for Microbial Characterization  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Underlying principles of molecular methods for microbial detection and characterization in natural and man-made ecosystems; emphasis on method application and data interpretation; emphasis on microbial pathogens and indicator organisms in foods and environment; laboratory covers select protocols.  
Prerequisites: FSTC 326/DASC 326; SCSC 405; POSC 429; approval of instructor.  
Cross Listing: SCSC 619, POSC 619, and VTMI 619.

FSTC 629/POSC 629 Microbiology of Food Irradiation  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Lecture plus laboratory overview of electron beam and x-ray based food irradiation principles; provides a working knowledge of using electronic pasteurization as a means of destroying microbial pathogens or retarding microbial spoilage in foods.  
Cross Listing: POSC 629/FSTC 629.

FSTC 630/SCSC 630 Cereal Grains for Human Food  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Fundamental concepts of dry milling, wet milling, oil extraction, baking, malting, brewing, storage, sanitation and quality evaluation and control interrelated with physical and biochemical properties of cereals and their products; use of instruments and techniques to evaluate cereal quality.  
Prerequisite: Approval of instructor.  
Cross Listing: SCSC 630/FSTC 630.

FSTC 631 Food Carbohydrates  
Credits 3. 3 Lecture Hours.  
Chemistry, structure, functionality and nutritional properties of food carbohydrates; fiber chemistry, functionality and nutritional properties, artificial sweeteners, starch structure and functionality and hydrocolloid functionality.  
Prerequisite: BICH 410. (Offered in alternate years.)

FSTC 634 Oilseed Proteins for Foods  
Credits 3. 3 Lecture Hours.  
World production, composition, processing technologies, uses of products (oil, meal, protein concentrates and isolates, and texturized products) in feeds and foods; present and potential food applications of oilseed proteins.  
Prerequisites: CHEM 228 and CHEM 317. (Offered in alternate years.)

FSTC 635 Oil and Fat Food Products  
Credits 3. 3 Lecture Hours.  
Composition, properties and reactions; sources, handling and storage of raw materials; extraction refining and bleaching; hydrogenation, deodorization, esterification and interesterification; fractionation; uses in salad oils, shortenings, margarine, bakery products and other foods.  
Prerequisites: CHEM 228 and CHEM 317. (Offered in alternate years.)

FSTC 640/NUTR 640 Therapeutic Microbiology I  
Credits 3. 3 Lecture Hours.  
Alimentary (gastrointestinal) microbiology including: (i) the "normal" intestinal microbiota; (ii) probiotic and prebiotic nutritional supplements; (iii) recombinant pharmabiotics; (iv) gut-associated lymphoid tissue and mucosal immunity; (v) foodborne gastrointestinal pathogens; and (vi) fermented products as functional foods.  
Prerequisite: Undergraduate survey course in microbiology (or instructor's consent).  
Cross Listing: NUTR 640/FSTC 640.

FSTC 644 Disease Mechanisms of Foodborne Pathogens  
Credits 3. 3 Lecture Hours.  
Principles of pathogenicity of foodborne bacteria; mechanisms used by disease-causing bacteria leading to human illness; basic principles of immunology and human and bacterial physiology; investigation of bacterial virulence factors and effects of stress response, quorum sensing and other external factors.  
Prerequisite: FSTC 326/DASC 326 or BIOL 351, or approval of instructor.

FSTC 647/ANSC 647 Technology of Meat Processing and Distribution  
Credits 3. 3 Lecture Hours.  
Quantitative and qualitative characteristics of meat and meat products as related to food technology processing operations; manufacturing, preservation, packaging and merchandising.  
Cross Listing: ANSC 647/FSTC 647.

FSTC 657/ANSC 657 Hazard Analysis and Critical Control Point System  
Credits 3. 3 Lecture Hours.  
Examination of the Hazard Analysis and Critical Control Point (HACCP) principles specifically related to meat and poultry; microbiological and process overviews; good manufacturing practices (GMP) and standard operating procedures (SOP) development; team-building and implementation into industry operations. This class is designed for the production of food and fulfills the training requirements of USDA's HACCP regulation for meat and poultry (9 CFR Part 417), and FDA's HACCP regulations for fish and fishery products (21 CFR Part 123 and 1240) and for juice (21 CFR Part 120).  
Cross Listing: ANSC 657/FSTC 657.
FSTC 667/ANSC 667 Industrial Processed Meat Operations
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Application of scientific principles and business practices to manufactured meat products; interrelationships among marketing, manufacturing, product development, regulatory compliance and quality assurance in commercial processed meat operations.
Prerequisite: Approval of instructor.
Cross Listing: ANSC 667/FSTC 667.

FSTC 669/NUTR 669 Experimental Nutrition & Food Science Laboratory
Credits 4. 1 Lecture Hour. 6 Lab Hours.
Experimental Nutrition & Food Science Laboratory. Nutritional intervention in animal models of metabolic or emotional disorders; genetic modifications or pathogens in food products; analyses of gene expression and behavior.
Prerequisite: BICH 432/GENE 432/GENE 432/BICH 432 recommended; graduate in nutrition or related major.
Cross Listing: NUTR 669/FSTC 669.

FSTC 671/NUTR 671 Critical Evaluation of Nutrition and Food Science Literature: Evidence Based Reviews
Credits 3. 3 Lecture Hours.
Evaluation of scientific literature, research methods within the literature, and the quality of scientific studies to produce an evidence-based review in areas specific to nutrition and food science.
Prerequisites: NUTR 202 or NUTR 203 and STAT 302; knowledge of nutrition, statistics, and technical writing helpful.
Cross Listing: NUTR 671/FSTC 671.

FSTC 681 Seminar
Credit 1. 1 Lecture Hour.
Oral reports and discussions of current research and developments in food technology designed to broaden understanding of problems and to stimulate research.

FSTC 684 Professional Internship
Credits 1 to 16. 1 to 16 Other Hours.
Experience in application of formal training to a commercial operation under supervision of operations manager and designated faculty member. Student will investigate matter of mutual interest and report results in a professional paper approved by the graduate committee.

FSTC 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed study of selected problems emphasizing recent developments in research techniques.

FSTC 687/ANSC 687 Sensory Evaluation of Foods
Credits 3. 2 Lecture Hours. 1 Lab Hour.
Application of sensory science principles and practices to food systems including an understanding of discriminative, descriptive and consumer sensory techniques.
Prerequisite: CHEM 222 or CHEM 228.
Cross Listing: ANSC 687/FSTC 687.

FSTC 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Special topics in an identified area of food science and technology. May be repeated for credit.

FSTC 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Investigations leading to thesis or dissertation in various areas of food science and technology.

FSTC 697/ANSC 697 Applied Microbiology for Foods of Animal Origin: Processing, Sanitation and Sanitary Design
Credits 3. 3 Lecture Hours.
Application of basic food microbiology knowledge and principles to food production processes and products; sources of microbiological contamination and their impact on food safety and spoilage; application of sanitary design and validation; testing and auditing to monitor and troubleshoot the process.
Prerequisites: DASC/FSTC 326/DASC 326 or FSTC 606/DASC 606 or equivalent.
Cross Listing: ANSC 697/FSTC 697.

GENE - Genetics

Courses

GENE 105 Perspectives in Genetics: Past, Present and Future
Credits 2. 2 Lecture Hours.
Impact of genetics on science and society: historical and continuing development of genetics and its contributions to agricultural, biological, medical, physical and social studies.
Prerequisite: Freshman or sophomore classification or approval of instructor.

GENE 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Introduction to laboratory research.
Prerequisite: Freshman or sophomore classification in genetics or approval of instructor.

GENE 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of genetics. May be repeated for credit.
Prerequisites: Freshman or sophomore classification in genetics; approval of instructor.

GENE 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in genetics. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

GENE 301 Comprehensive Genetics
Credits 3. 3 Lecture Hours.
Survey of the fundamental principles of genetics: Physical basis of Mendelian inheritance, expression and interaction of genes, linkage, sex linkage, biochemical nature of genetic material and mutation. No credit will be given for more than one of GENE 301, GENE 302, GENE 315 or GENE 320/BIMS 320. Not open to biochemistry or genetics majors.
Prerequisite: BIOL 112; concurrent enrollment in GENE 312.

GENE 302 Principles of Genetics
Credits 3. 3 Lecture Hours.
Mechanisms of inheritance, stressing the conservation of fundamental genetic processes throughout evolution, from bacteria to humans; mutations and phenotypes, Mendelian genetics, population genetics and evolution, and complex inheritance. Course designed for biochemistry, genetics and all majors in biology. No credit will be given for more than one of GENE 301, GENE 302, GENE 315 and GENE 320/BIMS 320.
Prerequisite: BIOL 112; concurrent enrollment in GENE 312.
GENE 310 Principles of Heredity
Credits 3. 3 Lecture Hours.
Basic principles of classical genetics, molecular genetics, mutation theory and genetic engineering; emphasis on humans and society. Not open to biochemistry and genetics majors.
Prerequisite: Junior classification.

GENE 312 Comprehensive Genetics Laboratory
Credit 1. 0 Lecture Hours. 3 Lab Hours.
Exercises in Mendelian genetics, meiosis, probability theory in pedigrees, population and quantitative genetics, as well as other genetics theory; molecular techniques to examine DNA and analyze outcomes.
Prerequisite: GENE 301 or GENE 302 or registration therein.

GENE 315 Genetics of Plants
Credits 3. 3 Lecture Hours.
Fundamental genetic principles as applied to plants; transmission, replication, expression and interaction of genes; linkage, recombination and mapping; chromosomal and gene mutation; behavior of genes in populations; selection, mating systems, cytoplasmic inheritance; molecular analysis and manipulation of genes and gene products; genetically modified plants. Not open to biochemistry or genetics majors. No credit will be given for more than one of GENE 301, GENE 302, GENE 315 or GENE 320/BIMS 320.
Prerequisite: BIOL 101 or BIOL 111.

GENE 320/BIMS 320 Biomedical Genetics
Credits 3. 3 Lecture Hours.
Fundamental genetic principles as applied to biomedical science; Mendelian inheritance, linkage and genetic mapping, mutagenesis and pedigree analysis; molecular basis of gene function and inherited disease; gene therapy and genetic counseling. No credit will be given for more than one of GENE 301, GENE 302, GENE 315 or GENE 320/BIMS 320.
Prerequisite: BIMS major with a minimum overall 2.5 Texas A&M GPA.
Cross Listing: BIMS 320/GENE 320.

GENE 404 Plant Breeding
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Application of genetics and other sciences to the breeding and improvement of horticultural crops; methods and special techniques employed.
Prerequisite: GENE 301.
Cross Listing: HORT 404/GENE 404.

GENE 405/BIMS 405 Mammalian Genetics
Credits 3. 3 Lecture Hours.
Comparative mammalian genetic systems with emphasis on laboratory animals; organization and expression of mammalian genes; development and use of genetically defined animals in biomedical and genetic research.
Prerequisite: GENE 302.
Cross Listing: BIMS 405/GENE 405.

GENE 406/BIOL 406 Bacterial Genetics
Credits 3. 3 Lecture Hours.
A problem oriented course surveying the manipulation and mechanisms of genetic systems in bacteria; recombination, gene structure and regulation of bacterial genes, plasmids and phages.
Prerequisites: GENE 302; BIOL 351.

GENE 411/MEPS 411 Biotechnology for Crop Improvement
Credits 3. 3 Lecture Hours.
Use of biotechnology to improve agricultural, horticultural and forest crops; techniques and methods used and case studies where biotechnology has been used to alter traits such as pathogen resistance, protein or oil consumption, ripening, fertility and wood properties.
Prerequisite: BIOL 111 or equivalent.
Cross Listing: MEPS 411/GENE 411.

GENE 412 Population and Ecological Genetics
Credits 3. 3 Lecture Hours.
Concepts of population genetics; dynamics of natural populations with emphasis on ecological interactions.
Prerequisite: GENE 302.

GENE 419/BICH 419 Computational Techniques for Evolutionary Analysis
Credits 3. 3 Lecture Hours.
Computational techniques for studying evolution; algorithms for construction and analysis of evolutionary relationships.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: BICH 419/GENE 419.

GENE 420 Bioethics
Credits 3. 3 Lecture Hours.
The application of ethical theory to the use of modern genetics and biochemistry stressing the social implications of genetic engineering, agricultural manipulation and biotechnology.
Prerequisites: GENE 302; BICH 410 or BICH 440.

GENE 421/BIMS 421 Advanced Human Genetics
Credits 3. 3 Lecture Hours.
A rigorous, analytical approach to genetic analysis of humans including diagnosis and management of genetic disease in humans; transmission of genes in human populations; human cytogenetics; the structure of human genes; human gene mapping; molecular analysis of genetic disease; genetics screening and counseling.
Prerequisites: GENE 302; BICH 410 or BICH 440.
Cross Listing: BIMS 421/GENE 421.

GENE 431/BICH 431 Molecular Genetics
Credits 3. 3 Lecture Hours.
Molecular basis for inheritance: gene structure and function, chromosomal organization, replication and repair of DNA, transcription and translation, the genetic code, regulation of gene expression, genetic differentiation and genetic manipulations.
Prerequisites: BICH 410 or BICH 440; GENE 301 or GENE 302 or GENE 320/BIMS 320.
Cross Listing: BICH 431/GENE 431.

GENE 432/BICH 432 Laboratory in Molecular Genetics
Credits 2. 6 Lab Hours.
Laboratory for molecular genetics providing technical experience with tools of molecular biology.
Prerequisite: GENE 301, GENE 302 or GENE 320/BIMS 320; BICH 410 or BICH 440.
Cross Listing: BICH 432/GENE 432.
GENE 450 Recombinant DNA and Biotechnology
Credits 3. 3 Lecture Hours.
Basic genetic engineering techniques; cloning with plasmid, lambda, cosmid and M13 vectors; gene libraries; DNA sequencing and mutagenesis; PCR; eukaryotic expression with yeast, baculovirus and mammalian vectors; transgenic animals and plants; gene therapy; monoclonal antibodies; bioremediation.
Prerequisites: BICH 431/GENE 431 or GENE 431/BICH 431 or concurrent registration; BICH 411 or 441 or concurrent registration.

GENE 452/BIMS 452 Modifying Mammalian Genomes for Biomedical Research
Credits 3. 3 Lecture Hours.
Review advances in the production of transgenic animals, the manipulation of embryonic stem cells for transgenics and therapeutics, the modification of specific genes in mammalian species by homologous recombination and RNA interference; special emphasis on genetic manipulation of cells and animals for biomedical research, stem-cell and gene therapy.
Prerequisite: GENE 302.
Cross Listing: BIMS 452/GENE 452.

GENE 481 Genetics I Seminar
Credit 1. 1 Lecture Hour.
Seminar topics on recent developments in genetics.
Prerequisites: GENE 302; GENE 431/BICH 431 or concurrent registration; senior classification or approval of instructor.

GENE 482 Genetics II Seminar
Credit 1. 1 Lecture Hour.
Student preparation and presentation of pertinent genetics topics.
Prerequisites: GENE 481; senior classification or approval of instructor.

GENE 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed study in genetics not included in established courses.
Prerequisites: Junior or senior classification; approval of instructor and department head.

GENE 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of genetics. May be repeated for credit.
Prerequisite: Approval of instructor.

GENE 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Laboratory research supervised by a faculty member. Registration in multiple sections of this course are possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification in genetics; approval of instructor and department head.

GENE 603 Genetics
Credits 4. 4 Lecture Hours.
Development of fundamental concepts related to the structure, function, organization, transmission and distribution of genetic material.
Prerequisite: GENE 301.

GENE 606 Quantitative Phylogenetics
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Designed to provide the theory and tools required for inference of phylogenetic (evolutionary) relationships among biological taxa using various types of comparative data including morphological characters, biochemical and molecular characters, and DNA sequences; hands-on analysis of data using contemporary tools.
Prerequisite: Entomology 601 or approval of instructor.
Cross Listing: ENTO 606 and WFSC 646.

GENE 608 Critical Analysis of Genetic Literature
Credit 1. 1 Lecture Hour.
An introduction to primary literature in the field of genetics which will give students experience in critically evaluating scientific papers and develop an appreciation of how genetics can be used to address important biological questions.

GENE 612 Population Genetics
Credits 3. 3 Lecture Hours.
Biological approach to genetic characteristics of populations dealing with genetic equilibrium, allelic variation, determination of genetic variation in populations, effects of mating systems, selection, mutation and drift on population parameters.
Prerequisites: GENE 603; STAT 651.

GENE 613 Quantitative Genetics I
Credits 3. 3 Lecture Hours.
Quantitative genetics concepts particularly dealing with partitioning of phenotypic variance into genetic and environmental components, selection response, effects of systems of mating, genetic covariance and threshold effects.
Prerequisites: GENE 612; STAT 652.

GENE 614/ANSC 614 Maximum Likelihood Estimation of Genetics
Credits 3. 3 Lecture Hours.
Theoretical and analytical approaches to the application of maximum likelihood for the estimation of parameters under linear and nonlinear models; single and polygene genetic models including Hardy-Weinberg equilibrium, linkage analysis and quantitative trait loci detection.
Prerequisites: GENE 603; STAT 651; STAT 652 or STAT 601.
Cross Listing: ANSC 614/GENE 614.

GENE 620 Cytogenetics
Credits 3. 3 Lecture Hours.
Examination and analysis of variation in chromosome structure, behavior and number; developmental and evolutionary effects of this variation.
Prerequisite: GENE 603.

GENE 626/ANSC 626 Analyses of Gene Expression
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Proficiency in handling DNA and RNA gained during exercises used routinely in analyses of gene expression; RNA preparation and analysis on Northern blots; in vitro transcription and polyacrylamide gel analysis of nucleic acids; sub-cloning and mRNA quantitation using polymerase chain reaction.
Prerequisites: GENE 450 or approval of instructor; radiation safety training.
Cross Listing: ANSC 626/GENE 626.
GENE 629 Applied Animal Genomics  
Credits 3. 3 Lecture Hours.  
Theory and application of genomics by livestock industries; consideration of genetic markers, gene mapping methods, genome analysis and emerging technologies such as microarrays, transgenesis, cloning and marker assisted selection; exposure to bioinformatic tools for genomics.  
Prerequisite: GENE 603 or approval of instructor.  
Cross Listing: ANSC 629 and POSC 630.

GENE 631/BICH 631 Biochemical Genetics  
Credits 3. 3 Lecture Hours.  
Genetic control of cellular metabolism. Mechanism of gene action; gene-enzyme relationships; regulation of gene expression; structure and organization of genomes; biochemical manipulation and characterization of genetic molecules.  
Prerequisite: GENE 431/BICH 431 or BICH 431/GENE 431; BICH 603.  
Cross Listing: BICH 631/GENE 631.

GENE 633/WFSC 633 Conservation Genetics  
Credits 3. 3 Lecture Hours.  
Genetic concepts and techniques relevant to management and conservation of biological diversity; research and conservation within a conservation genetics framework.  
Prerequisites: Introductory courses in genetics and ecology or biological conservation.  
Cross Listing: WFSC 633/GENE 633.

GENE 638/ANSC 638 Predictions of Genetic Merit  
Credits 3. 3 Lecture Hours.  
Mixed linear models and best linear unbiased prediction for genetic evaluation.  
Prerequisite: GENE 613.  
Cross Listing: ANSC 638/GENE 638.

GENE 643/SCSC 643 Molecular Quantitative Genetics and Plant Breeding  
Credits 3. 3 Lecture Hours.  
Classical, applied and molecular aspects of quantitative genetics in plant breeding; genetic relationships; genetic diversity; genetic phenomena (linkage, heterosis and epistasis); genotype by environment interaction; mapping quantitative trait loci (QTL); genomic and marker-assisted selection; application of statistical software.  
Prerequisites: STAT 651, SCSC 642 or GENE 613 or approval of instructor.  
Cross Listing: SCSC 643/GENE 643.

GENE 648/WFSC 648 Molecular Evolution  
Credits 3. 2 Lecture Hours. 1 Lab Hour.  
Theory and tools used in the analysis of molecular evolutionary patterns of DNA and protein sequences; format combines lecture presentations by instructor, discussion of relevant scientific literature, computer exercises, preparation of research proposal or independent research project, and practice in peer review process.  
Prerequisites: Basic courses in general Genetics and in Evolution.  

GENE 654 Analysis of Complex Genomes  
Credits 3. 3 Lecture Hours.  
History and current status of genetic and molecular analysis of higher eukaryotic genomes; coverage of techniques for dissection of genomes into manageable parts; investigations in genetics, breeding and evolution; emphasis on quantitative inheritance, genetic mapping, physical mapping, map-based cloning, with examples drawn from a wide range of organisms.  
Prerequisite: GENE 603.  
Cross Listing: SCSC 654 and MEPS 654.

GENE 655 Analysis of Complex Genomes—Lab  
Credits 3. 7 Lab Hours.  
Analysis of Complex Genomes—Lab. Laboratory methods in molecular genetic techniques for genetic mapping, physical mapping, and map-based cloning of both qualitative and quantitative phenotypes.  
Prerequisite: GENE 603 or equivalent or approval of instructor.  
Cross Listing: SCSC 655 and MEPS 655.

GENE 673/BICH 673 Gene Expression  
Credit 1. 1 Lecture Hour.  
Oral presentations and discussions related to the biochemistry and molecular biology of gene expression in animal, plant, and microbial systems. Course may be repeated for credit up to 12 times.  
Prerequisite: Graduate classification in biochemistry or genetics or approval of instructor.  
Cross Listing: BICH 673/GENE 673.

GENE 677/MCMD 677 Genes and Diseases  
Credits 3. 3 Lecture Hours.  
Molecular and genetic basis for human disease; structure, function and evolution of chromosomes; epigenetics; gene mapping; complex genetic traits; cancer genetics; neurodegenerative disorders; animal models (yeast, mouse, worms, fruit flies); ethics.  
Prerequisite: GENE 603, GENE 631/BICH 631, or MSCI 601 or approval of instructor.  
Cross Listing: MCMD 677/GENE 677.

GENE 681 Seminar  
Credit 1. 1 Lecture Hour.  
Reports and discussions of topics of current importance in genetics; reports to be prepared and presented by graduate students enrolled in course.

GENE 685 Directed Studies  
Credits 1 to 4. 1 to 4 Other Hours.  
Individual problems or research not pertaining to thesis or dissertation.  
Prerequisite: Approval of instructor.

GENE 689 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of genetics. May be repeated for credit.  
Prerequisite: Approval of instructor.

GENE 691 Research  
Credits 1 to 23. 1 to 23 Other Hours.  
Prerequisite: GENE 603.

GENE 697 Teaching Genetics Labs  
Credit 1. 1 Lecture Hour.  
Theory and practical aspects of teaching genetics labs, with emphasis on content, grading, instructional methods and practical aspects of genetics labs. May be repeated for credit.  
Prerequisites: Graduate classification in genetics; appointment as a TA for genetics labs.

GEOG - Geography
Courses

**GEOG 201 Introduction to Human Geography**
Credits 3. 3 Lecture Hours.
(GEOG 1302) Introduction to Human Geography. A survey of the major systems of man-land relations of the world and their dissimilar developments; the processes of innovation, diffusion, and adaptation stressed with regard to changing relationships between people and their environment.

**GEOG 202 Geography of the Global Village**
Credits 3. 3 Lecture Hours.
(GEOG 1303) Geography of the Global Village. Survey of world regions; globalization; environmental problems at multiple scales; human-environment interactions; cultural coherence and diversity; population and settlement; geopolitics; social and economic development; place identification.

**GEOG 203 Planet Earth**
Credits 3. 3 Lecture Hours.
(GEOG 1301) Planet Earth. Earth's physical environment including climate, water, landforms, and ecosystems; processes that control these systems and their global distributions; human effects on these processes.

**GEOG 205 Environmental Change**
Credits 3. 3 Lecture Hours.
Systems perspective on important attributes, elements, and connections within earth's physical environment; dynamic nature of environment at multiple spatial and temporal scales.

**GEOG 213 Planet Earth Lab**
Credit 1. 3 Lab Hours.
Exercises and maps to illustrate principles of physical geography.

**GEOG 232 Cartography and Visualization**
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Introduction to science and art of map production; principles of thematic map compilation and design; history of thematic mapping; map projections; data management and symbolization; common types and styles of thematic maps.

**GEOG 285 Directed Studies**
Credits 1 to 4. 1 to 4 Other Hours.
Individually-supervised research or intensive study on topics not covered in regular courses.

**GEOG 291 Research**
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in geography. May be taken 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.

**GEOG 301 Geography of the United States**
Credits 3. 3 Lecture Hours.
Geographic personality (physical and cultural) of the United States.

**GEOG 304 Economic Geography**
Credits 3. 3 Lecture Hours.
Location of economic activities over the earth; distribution of agriculture, manufacturing, tertiary activities and transportation; economic growth of areas.

**GEOG 305 Geography of Texas**
Credits 3. 3 Lecture Hours.
Exploration into the geographic personality of Texas: past and current physical and biotic environments; cultural pluralism, including ethnic origins and distinctive human ecologies; and the social, economic and political sources of environmental problems.

**GEOG 306 Introduction to Urban Geography**
Credits 3. 3 Lecture Hours.
Reasons humankind tends to congregate in cities. Overview of patterns in the geographic distribution of cities, and in the geographic distribution of peoples and activities within cities, and the dynamics of these distributions.

**GEOG 309 Geography of Energy**
Credits 3. 3 Lecture Hours.
Development of high-energy society; renewable and nonrenewable energy resources; physical and social economies of energy use; geography of energy; energy problems and decisions; dependence of other resources on energy; alternative energy futures.

**GEOG 311 Cultural Geography**
Credits 3. 3 Lecture Hours.
Human factors which affect man-land relationship; concept of culture, culture areas; population growth and migrations, types of economic activity, urban and transportation geography.

**GEOG 312 Data Analysis in Geography**
Credits 3. 3 Lecture Hours.
Foundation for collection and analysis of quantitative and qualitative geographic data; emphasis on hands-on, practical experience with commonly used analysis software and qualitative methods including interviewing and archival research; problems commonly encountered in dealing with data.

**GEOG 320 The Middle East**
Credits 3. 3 Lecture Hours.
Regional geography of the Middle East; physical setting and the historical evolution of Middle Eastern landscapes; current issues.

**GEOG 322 Geography of Latin America**
Credits 3. 3 Lecture Hours.
Physical and cultural characteristics of Latin America; physical landscape, cultural succession and the present cultural landscape; details on sub-regions.

**GEOG 323 Geography of Latin America**
Credits 3. 3 Lecture Hours.
Regional geography of European landmass; global, political and cultural characteristics of European geography in historical and ecological contexts.

**GEOG 324 Global Climatic Regions**
Credits 3. 3 Lecture Hours.
Climatological processes and their consequences for spatial distributions of climates; survey of earth's climates; relationships among climate, landforms, vegetation, soils and humans.

**GEOG 325 Geography of Europe**
Credits 3. 3 Lecture Hours.
Geographic personality (physical and cultural) of Europe.
GEOG 327 Geography of South Asia
Credits 3. 3 Lecture Hours.
South Asian geography; political and physical geographic divisions of South Asia; diversity of region; people, history, religion, cultures, political systems, rural and urban settings, climate, and environment; current problems and solutions.
Prerequisite: Junior or senior classification or approval of instructor.

GEOG 330 Resources and the Environment
Credits 3. 3 Lecture Hours.
Changing demand for land and sea resources; international conditions of population growth, resource depletion and geopolitical control; resource perceptions and decision-making.

GEOG 331 Geomorphology
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Principles and fundamentals of landform analysis. Laboratory work in advanced map interpretation.
Prerequisite: GEOL 101 or GEOG 203.

GEOG 335 Pattern and Process in Biogeography
Credits 3. 3 Lecture Hours.
Distribution of organisms across the earth and on environmental and cultural processes that have contributed to these patterns of distribution; dynamic nature of biogeographic patterns; impacts of contemporary and prehistoric humans on plant and animal distributions; methods for exploring biogeographic patterns and detecting change.
Prerequisite: Junior or senior classification.

GEOG 352/GEOL 352 GNSS in the Geosciences
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Fundamentals of Global Navigation Satellite Systems (GNSS); basic geodesy, figure of the earth; frames of reference, map projection, datums, ellipsoids; GPS accuracy and precision; applications in earth resource mapping and database creation; elementary GPS phase data processing.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: GEOL 352/GEOG 352.

GEOG 355 Concepts in Geographic Education
Credits 3. 3 Lecture Hours.
Key concepts and generalizations of geography; learning theory applied to geography and environmental education; development of field and computer-based technical/intellectual skills required to teach geography; curriculum and instructional issues related to geography.
Prerequisites: GEOG 201 or GEOG 202; GEOG 203 or equivalent.

GEOG 360 Natural Hazards
Credits 3. 3 Lecture Hours.
Introduction to the types and causes of natural events that pose risk to society; an examination of prevailing concepts and theories of human response and vulnerability; characteristics of natural events; natural hazard paradigms; case studies.
Prerequisites: GEOG 203 or GEOL 101; junior or senior classification.

GEOG 361 Remote Sensing in Geosciences
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Introduction to the principles, techniques and applications of remote sensing technology in geosciences including the analysis and interpretation of airborne and spaceborne remote sensing data for studying key earth system processes.
Prerequisite: Junior or senior classification.

GEOG 370/MARS 370 Coastal Processes
Credits 3. 3 Lecture Hours.
Introduction to the coastal system, waves and wave dominated coasts, shoreline morphodynamics, tidal and lake coasts, long term coastal development, sea level changes, subtidal and beach ecosystems, coastal dunes and wetlands, structures and organizations, coastal management and coastal hazards.
Cross Listing: MARS 370.

GEOG 380 Workshop in Environmental Studies
Credits 2 to 6. 2 to 6 Lab Hours.
The study, understanding and solution of human environment problems based on principles learned in the classroom; library, laboratory and field work carried out by individuals and in groups; reports on work accomplished. May be repeated for credit as many as three times.
Prerequisite: GEOG 330.

GEOG 390 Principles of Geographic Information Systems
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Basic concepts of design, planning and implementation of geographic information systems.
Prerequisite: Junior or senior classification.

GEOG 392 GIS Programming
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Programming for geographic information science applications; principles of programming syntax and data structures; development of custom GIS information systems.
Prerequisites: GEOG 390 and ESSM 465 or equivalents, or approval of instructor; junior or senior classification.

GEOG 398 Interpretation of Aerial Photographs
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Identification and evaluation of natural and cultural features on aerial photographs; methods for extracting information concerning land use, vegetative cover, surface and structural features, urban/industrial patterns and archaeological sites.
Prerequisites: Junior or senior classification or approval of instructor.

GEOG 400 Arid Lands Geomorphology
Credits 3. 3 Lecture Hours.
Introduction to the geomorphology of deserts; processes, origin and evolution of arid lands; urban geomorphology in drylands; desertification.

GEOG 401 Political Geography
Credits 3. 3 Lecture Hours.
The political process at a variety of geographic scales: international, intranational and urban; origins of territorial organization and conflicts over access to and use of space and its resources.

GEOG 404 Spatial Thinking, Perception and Behavior
Credits 3. 3 Lecture Hours.
Spatial thinking, spatial perception of the environment and the ways thinking and perception influence spatial behavior; role of geospatial technologies in supporting spatial thinking; models of spatial thinking acquisition; cognitive maps and spatial decision making; developing spatial thinking and individual differences.
Prerequisite: Junior or senior classification.

GEOG 405 Field Trips
Credits 1 to 4. 1 to 4 Other Hours.
Supervised field trip to investigate the physical, economic and cultural processes that influence the spatial development and distribution on the landscape. May be repeated for credit.
Prerequisites: Geography course at the 200-level or registration therein; approval of instructor.
GEOG 406 Geographic Perspectives on Contemporary Urban Issues
Credits 3. 3 Lecture Hours.
Contemporary readings on spatial patterns and processes in urban environments; sprawl; human-environment interaction; housing; development and growth; concept of place; scale; power and policy.
**Prerequisite:** GEOG 304 or GEOG 306 or equivalent.

GEOG 420 Geography of Terrorism
Credits 3. 3 Lecture Hours.
Exploration of global terrorism and counter terrorism; regional conflicts and mass violence; construction of places and regions associated with terror; American reactions to global terrorism.
**Prerequisite:** Junior or senior classification.

GEOG 430 Environmental Justice
Credits 3. 3 Lecture Hours.
Exploration into the spatial variability and human geography of exposure to environmental hazards in U.S. and international contexts; emphasizes environmental equity and environmental racism as it relates to occupational, leisure, and residential geography.
**Prerequisites:** GEOG 201 or GEOG 202; junior or senior classification.

GEOG 434 Hydrology and Environment
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Examination of hydrologic processes in relation to climate, soils, vegetation, land use practices, and human impacts; natural scientific perspectives emphasized; field and laboratory included.
**Prerequisite:** GEOG 203 or equivalent.

GEOG 435 Principles of Plant Geography
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Plant distributions, their associations and environmental relationships; survey of the principal explanatory systems; field and laboratory study of area patterns at various geographic scales. A weekend field trip is required.
**Prerequisite:** BIOL 101 or BIOL 107 or BIOL 301 or approval of instructor.

GEOG 440 History and Nature of Geography
Credits 3. 3 Lecture Hours.
Summary of classical knowledge of world; development of thought on nature of geography from 1800 to present.
**Prerequisite:** Junior or senior classification.

GEOG 442/GEOS 442 Past Climates
Credits 3. 3 Lecture Hours.
Terrestrial and marine proxy records of past climate variability, including tree rings, coral, and sediments; past climate change events such as the Little Ice Age and Medieval Warm Period; greenhouse gases and global temperature; insight into the nature of climate change and challenges humankind faces in the next few centuries.
**Prerequisites:** ATMO 201, or GEOG 203, or GEOL 101, or GEOL 104, or OCNG 251; junior or senior classification.
**Cross Listing:** GEOS 442/GEOG 442.

GEOG 450 Field Geography
Credits 3. 1 Lecture Hour. 6 Lab Hours.
Introduction to field methods; documenting materials, reconnaissance, the field plan; mapping traverse, base maps and aerial photographs; recording techniques; interview procedures. Fields trips required, some on weekends and/or semester breaks, for which departmental fees may be assessed to cover costs.
**Prerequisite:** 15 hours of geography or equivalent.

GEOG 461 Digital Image Processing in the Geosciences
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Key remote-sensing digital image processing methods; advanced topics in feature extraction, radiometric calibration, image enhancement, pattern recognition and geoscience applications.
**Prerequisite:** GEOG 361 or equivalent and junior or senior classification.

GEOG 462/ESSM 462 Advanced GIS Analysis for Natural Resources Management
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Advanced topics in geographic information systems (GIS) to solve natural resource problems; manipulation of raster data types; three-dimensional modeling; emphasis on geoprocessing as it relates to applied projects particularly with habitat suitability models; field and lab use of global positioning systems (GPS); internet-based GIS modeling.
**Prerequisites:** ESSM 351 or AGSM 461/SPSC 461 or equivalent or approval of instructor; junior or senior classification.
**Cross Listing:** ESSM 462/GEOG 462.

GEOG 467 Dynamic Modeling of Earth and Environmental Systems
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Dynamical systems modeling; key concepts and processes in earth and environmental systems; human impact on these systems; model building and testing; system behavior over time; model validation and sensitivity; examples from the applications in earth and environmental sciences.
**Prerequisite:** GEOG 203 or approval of instructor.

GEOG 475 Advanced Topics in GIS (Geographic Information Systems)
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Advanced Topics in Geographic Information Systems. Topics related to GIS implementation, spatial database design, spatial data analysis, and various advanced GIS applications.
**Prerequisite:** GEOG 390 or equivalent.

GEOG 476 GIS Practicum
Credits 3. 3 Other Hours.
Introduction to current topics in Geographic Information Science including ethical and legal issues surrounding spatial technologies, proper GIS management practices and professional certification; development of professional research, technical and communication skills through participation in a coordinated internship or independent research project. Meets writing-intensive course requirements for environmental geosciences, environmental studies and geography majors.
**Prerequisites:** Senior classification and enrollment in Geographic Information Science and Technology or approval of instructor.

GEOG 477 Terrain Analysis and Mapping
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Geomorphometry for land surface characterization; fundamentals of terrain analysis; theory of land surface dynamics; application of software for digital terrain modeling and analysis.
**Prerequisites:** GEOG 361 and GEOG 390 or equivalents, or approval of instructor; junior or senior classification.

GEOG 478 WebGIS
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Investigation of web-based geographic information systems; introduction to server-oriented architectures for web-based applications and services; development of web applications; management of web servers, web services and databases.
**Prerequisites:** GEOG 390 or equivalent, or approval of instructor; junior or senior classification.
GEOG 479 Principles of Geocomputation
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Geocomputation including geospatial technologies, computational techniques and algorithms utilizing high-performance computing; fundamental geocomputation principles, artificial and computational intelligence.
Prerequisites: GEOG 361 and GEOG 475 or equivalents, or approval of instructor; junior or senior classification.

GEOG 484 Internship
Credits 0 to 12. 0 to 12 Lecture Hours.
Directed internship in a private firm, government agency, or non-governmental organization to provide work experience related to the student's degree program and career objectives. May be taken 2 times for credit.
Prerequisites: Junior or senior classification and approval of internship agency and departmental internship director.

GEOG 485 Directed Studies
Credits 1 to 23. 1 to 23 Other Hours.
Individually supervised research or advanced study on restricted areas not covered in regular courses.
Prerequisite: Approval of department head.

GEOG 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of geography. May be repeated for credit.
Prerequisite: Approval of instructor.

GEOG 491 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in geography. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor.

GEOG 603 Processes in Economic Geography
Credits 3. 3 Lecture Hours.
Spatial organization and distribution of economic activity; patterns of land rent and land use; theories of economic development; models of spatial decision making.
Prerequisite: GEOG 304 or equivalent or approval of instructor.

GEOG 604 Processes in Physical Geography
Credits 3. 3 Lecture Hours.
Methodologies and problems of physical geography with emphasis on the interrelationships of the physical environment; a foundation course for graduate work in geography.
Prerequisite: Approval of instructor.

GEOG 605 Processes in Cultural Geography
Credits 3. 3 Lecture Hours.
Evolution of cultural landscapes; processes of innovation, diffusion and adaptation in context of developing human-environment relationships.
Prerequisite: Approval of instructor.

GEOG 610 Geographical Methods and Theory
Credits 3. 3 Lecture Hours.
Development of geography as a discipline; methods and theories used in geography for understanding place and for spatial analysis of human and biophysical phenomena.
Prerequisite: Graduate classification in geography or approval of instructor.

GEOG 611 Geographical Research Design
Credits 3. 3 Lecture Hours.
Methods, techniques and conceptual models for the conception, design, planning and conduct of geographical research.
Prerequisite: Graduate classification in geography or approval of instructor.

GEOG 612 Applied Climatology
Credits 3. 3 Lecture Hours.
Climate data and methods to solve a wide range of environmental problems; collection, processing, analysis and interpretation of surface observations, radar, satellite, reanalysis and climate model data; statistical methods and physical modeling; practical problems and development of tools for decision makers.
Prerequisite: Graduate classification.

GEOG 616 Urban Geography
Credits 3. 3 Lecture Hours.
Spatial patterns and processes of urban systems; growth and sprawl; environmental impacts; residential choice models; political fragmentation; economic development; power and privilege; place-based identity.
Prerequisite: GEOG 306 or equivalent.

GEOG 619 Human Impact on the Environment
Credits 3. 3 Lecture Hours.
Human alterations of landscapes, the atmosphere and the waters of the earth; interference with natural chemical cycles; disturbance of ecological equilibria; depletion of natural resources; roles of technology and population growth.
Prerequisite: Approval of instructor.

GEOG 621 Land-Use and Land-Cover Change
Credits 3. 3 Lecture Hours.
Human dimensions of land-use and land-cover change; theories of global and regional land-use and land-cover changes that emphasize processes, institutions, and patterns at multiple scales; methodologies and research agendas including geo-spatial analysis, modeling, and social science approaches.
Prerequisites: GEOG 619 or approval of instructor; Graduate classification.

GEOG 624 Biogeography: Theory and Methods
Credits 3. 3 Lecture Hours.
Prerequisite: Approval of instructor.

GEOG 625/ENTO 625 Landscape Ecology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Study of structure, function, and change in a heterogeneous land area composed of interacting ecosystems; examine basic ecological principles dealing with landscape structure.
Prerequisite: Approval of instructor.
Cross Listing: ENTO 625/GEOG 625.

GEOG 626 Fluvial Geomorphology
Credits 3. 3 Lecture Hours.
Concepts and methods applicable to the fluvial systems; components affecting rivers and drainage basin and analysis geomorphology; analytical treatment of problems arising from fluvial changes.
Prerequisite: GEOG 203 or approval of instructor.
GEOG 627 Arid Lands
Credits 3. 3 Lecture Hours.
Processes and landforms in dryland environments; nature and dynamics of gravity, water and wind in deserts; Quaternary climates and arid lands; human impact in drylands.
Prerequisite: GEOG 604 or approval of instructor.

GEOG 629 Cultural and Political Ecology
Credits 3. 3 Lecture Hours.
History of ideas about humans and environment; political and social meanings of nature and culture; access and control of resources; theories of environmental change; geographic approaches to political ecology research; current debates and future directions.

GEOG 635 Advanced Biogeography
Credits 3. 3 Lecture Hours.
Theory and contemporary research in biogeography; methods used in conducting biogeographical research; spatial and temporal changes in the distribution of organisms; influences of humans and the physical environment on biogeographic patterns.
Prerequisite: GEOG 624 or approval of instructor.

GEOG 642/GEOS 642 Past Climates
Credits 3. 3 Lecture Hours.
Terrestrial and marine proxy records of past climate variability, including tree rings, coral, and sediments; past climate change events such as the Little Ice Age and Medieval Warm Period; greenhouse gases and global temperature; insight into the nature of climate change and challenges humankind faces in the next few centuries.
Prerequisite: Graduate classification.

Cross Listing: GEOS 642/GEOG 642.

GEOG 644 Geographic Education: Theory and Practice
Credits 3. 3 Lecture Hours.
Geography as an element of the educational system: K-12, undergraduate, graduate; geography's role in curricula and its practice in classrooms; course design and integration of geographic concepts into classroom instruction.
Prerequisite: Graduate classification.

GEOG 645 Research in Geographic Education
Credits 3. 3 Lecture Hours.
Research in geographic education and the interface between research in geography and geographic education; identification of research questions; choice of methodology; review of literature; data collection and analysis; communication of results.
Prerequisite: Graduate classification.

GEOG 648 Political Geography of the World-System.
Credits 3. 3 Lecture Hours.
Political and geopolitical evolution of the modern world-system; major geopolitical theories,settler colonization, extractive colonization, imperialism, decolonization, development of European state-system hegemonic change and theory of world leadership cycles.
Prerequisite: Graduate classification.

GEOG 651 Remote Sensing for Geographical Analysis
Credits 3. 3 Lecture Hours.
Provides and introduction to remote sensing fundamentals. Discussion of past, present and planned earth observing sensors as well as technical issues involved in the collection, processing and interpretation of remote sensing images with emphasis on application to geographic problems, including geomorphology, hydrology and coastal oceanography.
Prerequisite: Graduate classification.

GEOG 652 Quantitative Methods in Geography
Credits 3. 3 Lecture Hours.
Designed to acquaint with quantitative methods commonly used in geographical research to describe, characterize, model and analyze geo-spatial data.
Prerequisite: Approval of instructor.

GEOG 659 Geodatabases
Credits 4. 3 Lecture Hours. 2 Lab Hours.
GIS data modeling; introductory and advanced spatial SQL (structured query language); spatial database management system (DBMS) server setup, management and maintenance; spatial DBMS design, implementation, tuning, performance analysis and indexing; connecting spatial data services and warehouses to GIS software.

GEOG 660 Applications in GIS
Credits 3. 3 Lecture Hours.
Integrates spatial analysis and modeling with GIS for environmental and socio-economic applications.
Prerequisites: GEOG 390; STAT 651 and STAT 652.

GEOG 661 Digital Image Processing and Analysis
Credits 3. 3 Lecture Hours.
Principles of georectifying, processing, manipulating and interpreting data collected by nonphotographic sensors concentrating on solid earth resources using Thematic Mapper with supplemental data from the SPOT satellite.
Prerequisite: GEOG 332 or approval of the instructor.

GEOG 662 GIS in Land and Property Management
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Introduction to concepts of design, planning and implementation of GISs related to commercial real estate development; case studies for land and property management; laboratory exercises in practical applications for real estate.
Prerequisites: Enrollment in Master of Land Economics and Real Estate; approval of instructor.

GEOG 665 GIS-Based Spatial Analysis and Modeling
Credits 3. 3 Lecture Hours.
Investigates methodology of integrating various spatial analysis and modeling techniques with GIS for environmental/socio-economic applications; practical applications; theoretical/technical aspects of related issues in detail.
Prerequisites: GEOG 390; STAT 651 or equivalent; approval of instructor.

GEOG 666 Coastal Geomorphology
Credits 3. 3 Lecture Hours.
Essential concepts and methods to coastal geomorphology; review history and processes of coastal geomorphology; analytical treatment of problems associated with coastal environmental changes.
Prerequisite: GEOG 203 or equivalent.

GEOG 667 Dynamic Modeling of Earth and Environmental Systems
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Dynamical systems modeling; dynamic complexity; key concepts, processes and human impact on earth and environmental systems; model building and testing; system behavior over time; model validation and sensitivity; examples from the applications in earth and environmental sciences.
Prerequisite: Approval of instructor.
GEOG 668 Arctic Climates
Credits 3. 3 Lecture Hours.
Arctic climate system, physical characteristics and climatic features, the
atmospheric energy budget, the atmospheric circulation, the surface
energy budget, the hydrologic cycle, and the interactions between the
atmosphere, Arctic Ocean, and the sea ice cover.
Prerequisite: Graduate classification.

GEOG 676 GIS Programming
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Automation of GIS software; integration of custom code as extensions into
GIS software; programmatic manipulation of GIS data.
Prerequisite: Graduate classification.

GEOG 678 WebGIS
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Internet architectures; setup, management and maintenance of web-based
Geographic Information System (WebGIS) servers, data and services; use
of WebGIS data an services in the creation of custom web-based maps;
analysis of WebGIS system architecture, design and implementation.
Prerequisite: Graduate classification.

GEOG 681 Seminar
Credit 1. 1 Lecture Hour.
Reports and discussions of current research and selected topics.
Prerequisite: Approval of department head.

GEOG 685 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
For students with major or minor in geography to undertake investigations
in special aspects of geography.
Prerequisite: Approval of instructor.

GEOG 687/ANTH 624 Geoarchaeology
Credits 3. 3 Lecture Hours.
Application of geological concepts and methods to archaeological research;
history of geoarchaeology; site formation processes; modification of archaeological sites and sediments; landscape reconstruction and change and their effects on human behavior.
Prerequisite: ANTH 602 or equivalent.
Cross Listing: ANTH 624/GEOG 687.

GEOG 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of geography. May be repeated for credit.
Prerequisite: Approval of instructor.

GEOG 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Original research in various areas of geography. Research for thesis or dissertation.

GEOG 695 Frontiers in Geographic Information Science
Credits 3. 3 Lecture Hours.
Theoretical foundations and the latest development of geographic information science (GIScience); topics related to representations of space and time, geocomputation, spatially integrated social sciences, and social informatics.
Prerequisite: Introductory GIS.

GEOG 696 Geomorphology and Remote Sensing
Credits 3. 3 Lecture Hours.
Application of remote sensing to study landforms, imagery, includes, aerial photography; LANDSAT, SPOT, TM and shuttle photography.
Prerequisite: GEOG 203 or approval of instructor.

GEOG 699 Directed Research
Credits 1 to 4. 1 to 4 Other Hours.
Directed research in specific problem areas of geography.
Prerequisite: Approval of instructor.

GEOL - Geology

Courses

GEOL 101 Principles of Geology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Prerequisites: GEOL 101, GEOL 104 or GEOL 320; CHEM 101; MATH 131 or MATH 151 or approval of instructor.*

GEOL 104 Physical Geology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Earth materials, structures, external and internal characteristics; physical processes at work upon or within the planet. A working knowledge of high school chemistry and mathematics is required.

GEOL 106 Historical Geology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Prerequisites: GEOL 101 or equivalent.

GEOL 108 Dinosaur Life and Times
Credit 1. 1 Lecture Hour.
Dinosaur paleobiology and paleoecology; terrestrial paleoclimate and paleoenvironments of the Mesozoic; dinosaur ancestors; appearance and radiation of dinosaurs; paleoecology and paleobiology of major dinosaur groups; extinction of large dinosaurs and the Cretaceous-Paleogene mass extinction; the appearance and ancestry of birds. Not open to students who have taken GEOL 307.

GEOL 203 Mineralogy
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Crystallography, crystal chemistry, mineral chemistry, optical crystallography, physical properties, and geologic occurrence of rock-forming and economic minerals.
Prerequisites: GEOL 101, GEOL 104 or GEOL 320; CHEM 101; MATH 131 or MATH 151 or approval of instructor.

GEOL 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed studies in specific problem areas of geology.
Prerequisite: Approval of instructor.

GEOL 291 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in geology.
May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Freshman or sophomore classification and approval of instructor.

GEOL 300 Field Geology
Credits 6. 6 Other Hours.
Basic concepts of field relationships and field techniques are used to develop geologic maps, stratigraphic columns, cross-sections and geologic interpretations for a variety of geologic provinces. Course conducted off-campus in a field camp for six weeks.
Prerequisites: GEOL 302, GEOL 306, GEOL 309, GEOL 312 or approval of instructor.*
GEOL 301 Mineral Resources  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Origin, geologic relations and geographic distribution of mineral and energy resources; mineral economics, mining and reclamation and global economics in the resource industry; identification and classification of economic minerals including energy resources, base and precious metals, chemical industrial minerals and gemstones.  
Prerequisites: GEOL 101 or GEOL 320; CHEM 106 or higher.*

GEOL 302 Introduction to Petrology  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Introduction to the origin and evolution of igneous, sedimentary, and metamorphic rocks; classification and petrographic analysis of major rock types; relationships to tectonic settings.  
Prerequisites: GEOL 104 and GEOL 203 or approval of instructor.

GEOL 304 Igneous and Metamorphic Petrology  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Origin, identification and classification of igneous and metamorphic rocks; genetic processes inferred from laboratory studies and field occurrences.  
Prerequisites: GEOL 302 and GEOL 309 or approval of instructor.*

GEOL 305 Paleobiology  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Principles of paleobiology; study of organisms important in the marine fossil record; application of paleontology to geologic problems.  
Prerequisite: GEOL 106 or approval of Instructor.

GEOL 306 Sedimentology and Stratigraphy  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Origin of sediments and sedimentary rocks; climate, weathering, and weathering products; transport, deposition, and depositional environments for sediments; field and laboratory studies in description and interpretation of genesis of sedimentary rocks; principles of stratigraphy and basin analysis; plate tectonics and the formation of sedimentary basins; stratigraphic nomenclature; geologic time and correlation; sequence stratigraphy and basin architecture.  
Prerequisite: GEOL 101 or GEOL 104 or approval of instructor.*

GEOL 308 Integrated Earth Science  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Integrated processes shaping Earth's crust, continents, ocean basins, atmosphere and biosphere; place of Earth in the universe; relationship between Earth and human society; related fundamental physical and biological science principles and processes within an integrated Earth science context. Not an elective for students pursuing degrees as professional geologists.  
Prerequisite: GEOL 101 or GEOG 203.*

GEOL 309 Introduction to Geological Field Methods  
Credits 3. 1 Lecture Hour. 6 Lab Hours.  
Geological mapping methods, field observation procedures and data gathering and recording; use of Brunton compass; pace-and-compass mapping; topographic map use and interpretation; measurement of structural elements; interpretation of geologic map patterns; measurement of stratigraphic sections; construction of geologic cross sections; six day geologic mapping project during either spring break or two three-day weekends.  
Prerequisites: GEOL 101 or GEOL 104; GEOL 106.*

GEOL 310 Planetary Geology  
Credits 3. 3 Lecture Hours.  
Introduction to planetary science; organization and composition of the solar system, including the planets, satellites and asteroids; surface features and internal structures of the terrestrial planets and moons; the dynamic processes of planetary resurfacing, including volcanism, tectonism, weathering and impacts; the history and future of solar system exploration.  
Prerequisites: GEOL 101 or GEOL 104; junior or senior classification or approval of instructor.

GEOL 311 Principles of Geological Writing  
Credit 1. 1 Lecture Hour.  
Principles of writing for geological reports; format and style for abstracts, grant proposals, journal manuscripts and industry reports; evaluating written reports for revision and editing; using proper referencing and citation style; methods of maintaining clarity in documents; using web tools for geological communication.

GEOL 312 Structural Geology and Tectonics  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Interpretation of rock structures; their relation to stratigraphic, physiographic and economic problems; regional tectonics of several selected areas.  
Prerequisites: GEOL 101, GEOL 104 or GEOL 320; approval of instructor.*

GEOL 316 Team Research in Geology and Geophysics  
Credits 3. 0 Lecture Hours. 9 Lab Hours.  
Team-based research in geology and geophysics; hypothesis development, data collection, data interpretation; communication of geological/geophysical interpretations and data. May be taken four times for credit.  
Prerequisites: GEOL 203 or concurrent enrollment and approval of instructor.

GEOL 320 Geology for Civil Engineers  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Principles of physical and engineering geology; properties of minerals, rocks and soils; active surface and subsurface processes; applications to the siting, design, construction, operation and maintenance of engineered works and the protection of the environment. A three-day field trip is required (a field trip fee is charged at registration).  
Prerequisite: Sophomore classification.*

GEOL 330 Geologic Field Trips  
Credits 1 to 3. 1 to 3 Other Hours.  
Field trips to observe, analyze and interpret the geology and geophysics of selected localities in Texas and adjacent regions; complements classroom experience. Trip frequencies, duration, dates and study localities vary with semester.  
Prerequisite: GEOL 101 or GEOL 104 or approval of instructor. May be repeated for credit.*

GEOL 352 GEOG 352 GNSS in the Geosciences  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Fundamentals of Global Navigation Satellite Systems (GNSS); basic geodesy, figure of the earth; frames of reference, map projection, datums, ellipsoids; GPS accuracy and precision; applications in earth resource mapping and database creation; elementary GPS phase data processing.  
Prerequisites: Junior or senior classification; approval of instructor.  
Cross Listing: GEOG 352/GEOL 352.
GEOL 400 Reservoir Description  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
An integrated reservoir characterization and design experience for seniors in petroleum engineering, geology and geophysics; includes using geophysical, geological, petrophysical and engineering data; emphasis on reservoir description (reservoir and well data analysis and interpretation), reservoir modeling (simulation), reservoir management (production optimization) and economic analysis (property evaluation).  
Prerequisite: Junior or senior classification or approval of instructor.

GEOL 404 Geology of Petroleum  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Origin, migration and accumulation of petroleum; typical U.S. oil and gas fluids; laboratory work in subsurface geology.  
Prerequisites: GEOL 312; senior classification in geology.

GEOL 410 Hydrogeology  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Geologic conditions determining the distribution and movement of ground water and their effect on the hydrologic properties of aquifers.  
Prerequisite: Junior or senior classification or approval of instructor.

GEOL 420 Environmental Geology  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Geologic concepts of the nature of geologic environments and the dynamics of geologic processes needed to characterize and quantify human interactions with specific geologic systems including aquifers, watersheds, coastlines and wetlands; specific techniques, including geophysical and geochemical techniques, field mapping, geographical information systems and remote sensing used to monitor human-geosphere interactions.  
Prerequisites: GEOL 101 or GEOG 203; junior or senior classification or approval of instructor.

GEOL 440 Engineering Geology  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Fundamentals of soil, rock and fluid mechanics and basic engineering practices as applied to the analysis of the geologic environment for engineering uses. Designed for geoscience majors who have not had engineering courses.  
Prerequisites: GEOL 312 or approval of instructor; PHYS 218.*

GEOL 451 Introduction to Geochemistry  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Chemical principles and processes responsible for the formation and cycling of earth materials, with emphasis on low temperature equilibria and kinetics in rockwater systems.  
Prerequisite: GEOL 302 or approval of instructor.

GEOL 478 Earth Science Modeling  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Techniques for building, solving and analyzing numerical models applied to a wide variety of problems in geology, geochemistry, geobiology and geophysics; derivation and scaling of conservation laws; finite difference and finite element techniques; programming in MATLAB or a higher-level language.  
Prerequisites: MATH 151; MATH 152; junior or senior classification.

GEOL 484 Internship  
Credits 0. 0 Other Hours.  
Directed internship in a private firm, government agency or non-governmental organization to provide work experience related to the student’s degree program and career objectives. May be taken two times.  
Prerequisites: Junior or senior classification and approval of internship agency and approval of instructor.

GEOL 485 Directed Studies  
Credits 1 to 12. 1 to 12 Other Hours.  
Advanced problems in geology.

GEOL 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified area of geology. May be repeated for credit.  
Prerequisite: Approval of instructor.

GEOL 491 Research  
Credits 0 to 4. 0 to 4 Other Hours.  
Research conducted under the direction of faculty member in geology. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.  
Prerequisites: Junior or senior classification and approval of instructor.

GEOL 609 Field Geology  
Credits 1 to 6. 1 to 6 Other Hours.  
Individual instruction in advanced and specialized field methods, geologic interpretation and field evaluation procedures. Choice of topics and locations of field studies will vary depending upon individual and specific needs.  
Prerequisite: GEOL 300 or approval of instructor.*

GEOL 610 Field Methods in Hydrogeology  
Credits 3. 1 Lecture Hour. 6 Lab Hours.  
Field methods in hydrogeology; including ground water drilling technology and law; investigation and planning of well sites; installation of ground water wells; field testing of aquifer properties and analysis of field data. Field trips may be required for which departmental fees may be assessed to cover costs.  
Prerequisite: GEOL 410 or approval of instructor.

GEOL 612 Structural Geology  
Credits 3. 3 Lecture Hours.  
Mechanical principles important to structural geology and experimental results relating to rock deformation followed by applications to natural deformation; mechanisms, rather than geometries. Primarily for students not concentrating in structural geology but who desire an advanced general course.  
Prerequisite: Approval of instructor.

GEOL 614 Advanced Hydrogeology  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
(2-2) Geologic conditions determining the distribution and movement of ground water and their effect on the hydrologic properties of aquifers.

GEOL 619 Petroleum Geology  
Credits 3. 3 Lecture Hours.  
Properties of reservoir rocks; origin, migration and accumulation of petroleum; geologic interpretation of borehole logs and fluid-pressure measurements and the role of hydrostatic and hydrodynamic pressures in oil accumulation.  
Prerequisite: Approval of instructor.

GEOL 621 Contaminant Hydrogeology  
Credits 3. 3 Lecture Hours.  
Physical concepts of mass transport; dispersion; diffusion; advection; geochemical processes including surface reaction; hydrolysis; biodegradation; aspects of modeling; process and parameter; and remediation.  
Prerequisite: GEOL 410 or approval of instructor.
GEOL 622 Stratigraphy  
**Credits 3.3 Lecture Hours.**  
Principles for correlating and naming stratigraphic units; controls on stratigraphic development (sediment supply, base-level change, subsidence, climate, and compaction); principles and application of sequence stratigraphy; subsurface stratigraphy; facies analysis and stratigraphic architecture.  
**Prerequisite:** Graduate classification or approval of instructor.

GEOL 623 Carbonate Rocks  
**Credits 3.3 Lecture Hours.**  
Principles of carbonate sedimentology; carbonate depositional sequences defined in modern environments and utilized to interpret the rock record; introduction to depositional and diagenetic microfacies; shelves, ramps and isolated platforms and their tectonostratigraphic significance; suggested for geoscience majors.  
**Prerequisites:** A basic understanding of sedimentology and the associated terminology; graduate classification.

GEOL 624 Carbonate Reservoirs  
**Credits 3.3 Lecture Hours.**  
Recognition and description of hydrocarbon reservoirs in carbonate rocks; classification of carbonate porosity; capillary pressure curves and pore types; pore characteristics as proxies for permeability in reservoir modeling; techniques for mapping flow units.  
**Prerequisites:** Graduate classification and approval of instructor.

GEOL 625 Applied Ground Water Modeling  
**Credits 3.3 Lecture Hours.**  
Concept of groundwater flow and contaminant transport; numerical simulations of solving flow and transport equations; finite difference and finite element methods; software structures of groundwater flow, contaminant transport, density-dependent fluid flow and hydrocarbon remediations; real case applications of software including geological, physical, chemical, biological and hydrological information.  
**Prerequisite:** GEOL 410 or approval of instructor.

GEOL 629 Regional Geology of North America  
**Credits 3.3 Lecture Hours.**  
Regional geology of North America, examining the accumulation and deformation of the rock units involved; structural form and style emphasized; entire geologic history investigated.  
**Prerequisite:** Graduate classification or approval of instructor.

GEOL 631 Engineering Geomorphology  
**Credits 3.3 Lecture Hours.**  
Active surface processes as they influence engineering construction; erosion, rivers and floods, slope processes, subsidence, coastal processes, ice, weathering and ground water.  
**Prerequisites:** Graduate classification in engineering or geosciences; GEOG 331 or approval of instructor.

GEOL 633 River Restoration  
**Credits 3.3 Lecture Hours.**  
Geologic, geomorphic and geomechanical principles applied to the investigation, design, construction, and maintenance of river restoration projects.  
**Prerequisite:** GEOL 631 or GEOG 626 or approval of instructor.

GEOL 635 Engineering Geology  
**Credits 3.3 Lecture Hours.**  
Geological principles applied to the investigation design, construction and maintenance of engineering projects; history, development and role of engineering geologic practice as applied to dams, waste disposal, surface and ground water, tunneling, quarrying and construction materials.

GEOL 640/WMHS 640 Geochemistry of Natural Fresh Waters  
**Credits 3.3 Lecture Hours.**  
Chemistry of aqueous solutions; weathering/redox reactions and controls on fresh waters; natural and anthropogenic factors affecting major, minor, and trace elements in fresh waters; evaluation of fresh water composition; application of water-quality measurements to quantitative hydrology.  
**Cross Listing:** WMHS 640/GEOL 640.

GEOL 641 Environmental Geochemistry  
**Credits 3.3 Lecture Hours.**  
Geochemical processes affecting the fate and transport of inorganic and organic pollutants in terrestrial systems; equilibrium and kinetic modeling.  
**Prerequisite:** GEOL 451 or approval of instructor.

GEOL 643 Introduction to Electron Microprobe Analysis  
**Credits 2.1 Lecture Hour. 3 Lab Hours.**  
Digital imaging and qualitative and quantitative chemical analysis of geological and material science samples using the electron microprobe; emphasis on quantitative chemical analysis using WDS (wavelength-dispersive spectrometry) methods; use the electron microprobe and correctly interpret analytical results.  
**Prerequisite:** Approval of instructor.

GEOL 645 Geochronology  
**Credits 3.3 Lecture Hours.**  
Earth’s 4.5 billion-year history is divided into units of geologic time based on the observed changes in the rock record: the timing of those changes is quantified by numerical dating methods: this course examines both dating methods and physical and biological changes observed in the rock record.  
**Prerequisite:** Graduate classification or approval of instructor.

GEOL 648 Stable Isotope Geology  
**Credits 3.2 Lecture Hours. 3 Lab Hours.**  
Stable isotopes of oxygen, carbon, sulfur and hydrogen applied to problems in paleontology and paleoecology, carbonate diagenesis, petroleum exploration, and igneous and metamorphic petrology; isotopic paleotemperatures; analytical methods; theory of isotopic fractionation.  
**Prerequisite:** GEOL 451 or approval of instructor.

GEOL 650 Paleoecology  
**Credits 3.2 Lecture Hours. 3 Lab Hours.**  
Interrelationships of organisms and environment in the fossil record; methods and criteria available for interpreting ancient environments; critical review of classical studies and current research in paleoecology.  
**Prerequisite:** Approval of instructor.

GEOL 651 Paleoenvironmental Community Analysis  
**Credits 3.3 Lecture Hours.**  
Quantitative analysis of multivariate paleoenvironmental community data; measurement of diversity; cluster analysis; gradient analysis by standard and canonical ordination techniques.  
**Prerequisite:** A basic course in statistics or approval of instructor.

GEOL 652 Biogeology  
**Credits 3.2 Lecture Hours. 3 Lab Hours.**  
Major trends and processes in the evolution of life through geologic time. Interrelationships of biological and physical processes in earth history; application of paleontology to current problems in geology; critical review of modern developments in biogeology.  
**Prerequisite:** GEOL 305 or approval of instructor.
GEOL 653 Geobiological Research
Credits 3. 1 Lecture Hour. 6 Lab Hours.
Team-based research in modern or historical geobiology; definition of questions and hypothesis testing; analytical techniques; project lifecycle; reporting of results. May be taken two times for credit.
Prerequisite: Approval of instructor.

GEOL 654 Evolutionary Patterns and Theory
Credits 3. 3 Lecture Hours.
Evolutionary patterns in the fossil record and application of evolutionary theory to understanding these patterns; comparisons of neo-Darwinian and punctuational hypotheses; events and processes pertaining to microevolutionary and macroevolutionary change; and methods of determine phylogenies of organisms.
Prerequisite: Graduate classification in geological or biological sciences.

GEOL 658 Earth Systems Through Deep Time: Global Change, Paleoclimate and Life
Credits 3. 3 Lecture Hours.
History and cause of global change in the earth system, Archean to Holocene; Impact of biotic change on the earth system; influence of tectonics on paleochemistry and climate change; influence of climate on tectonics; methods and models for evaluating global change.
Prerequisite: Graduate classification.

GEOL 663 Fracture and Faulting of Rocks
Credits 3. 3 Lecture Hours.
The structure of fractures and faults in the Earth's crust at the macroscopic and microscopic scale; formation and evolution of faults, faults networks and fault zones; fault-related rocks and faulting mechanisms; influence of faults on fluid flow properties; seismic faulting and creep; current problems and research opportunities.
Prerequisite: Graduate classification.

GEOL 664 Mechanical Analysis in Geology
Credits 3. 3 Lecture Hours.
Mechanical analysis of geological problems based on concepts of stress, strain, strength, elasticity, viscosity and plasticity; folding, faulting, dike formation, hydraulic fracturing, magma and glacial flow, and cooling of magmatic bodies.
Prerequisites: MATH 253; approval of instructor.

GEOL 665 Structural Petrology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Mechanisms of rock deformation from single crystal to mountain range; techniques for mapping stresses and strains and for inferring physical conditions and mechanical behavior at time of deformation; laboratory assignments on descriptive techniques include petrographic microscope-universal stage methods, field procedures and data analysis.
Prerequisite: Approval of instructor.

GEOL 668 Clastic Sedimentology and Sedimentary Petrology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Detailed analyses of clastic sedimentary rocks: relationships of facies and depositional environments with emphasis on continental, coastal and shallow shelf clastic sediments; petrography and diagenesis of modern and ancient clastic sediments.
Prerequisites: Optical mineralogy course and sedimentology (undergraduate); graduate classification.

GEOL 678 Earth Science Modeling
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Techniques for building, solving and analyzing numerical models applied to a wide variety of problems in geology, geochemistry, geobiology and geophysics; derivation and scaling of conservation laws; finite difference and finite element techniques and error analysis; programming in MATLAB or a high-level language.

GEOL 681 Seminar
Credit 1. 1 Lecture Hour.
Reports and discussions of current research and selected topics from geologic literature.
Prerequisite: Graduate classification.

GEOL 685 Directed Studies
Credits 1 to 12. 1 to 12 Other Hours.
Enables graduate students to undertake limited investigations not within their thesis or dissertation research and not covered in established curricula.
Prerequisites: Graduate classification and approval of instructor.

GEOL 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 1 to 7 Lab Hours.
Selected topics in an identified area of geology. May be repeated for credit.
Prerequisite: Approval of instructor.

GEOL 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Original research on problems in various phases of geology. Research for thesis or dissertation.

GEOP - Geophysics

Courses

GEOP 291 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in geophysics. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Freshman or sophomore classification and approval of instructor.

GEOP 341 Global Geophysics
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Introduction to the structure, composition and evolution of the Earth as inferred by geophysical methods; seismology, gravity and geodesy, magnetics, heat flow and concepts of plate tectonics.
Prerequisites: GEOL 101 or GEOL 104; MATH 131 or MATH 151; or approval of instructor.

GEOP 413 Near-surface Geophysics
Credits 3. 3 Lecture Hours.
Fundamentals of traditional and emergent surface and borehole geophysical methods, as they are applied to shallow (less than 100 meters) subsurface investigations; emphasis on electrical, magnetic and electromagnetic methods; seismic reflection and crosswell tomography.
Prerequisites: GEOL 101 or GEOL 104; MATH 251; or approval of instructor.
GEOP 421 Petroleum Seismology I  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Physical principles behind seismic acquisition; acoustic/elastic, homogeneous/heterogeneous, onshore/offshore/transitional zones; description of seismic data, pre- and post-critical reflections, multiples, ground roll; signal processing for seismic data analysis; Fourier transforms, wavelet transform, correlation and smoothness; least squares optimization; forward and inverse problems fitting a Fourier series, deconvolution.  
Prerequisites: MATH 151 and MATH 152 or approval of instructor.  

GEOP 435 Methods of Geophysical Exploration  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Introduction to theory of gravity, magnetic, electrical and seismic exploration methods; physical properties of earth materials and their influence on geophysical measurements; limitations of geophysical data in the interpretation of subsurface structure.  
Prerequisites: GEOL 309; MATH 251.*  

GEOP 470 Computational Geophysics  
Credits 3. 3 Lecture Hours.  
Techniques used in the study of geophysical processes, including heat and chemical transport in the Earth, rock deformation and viscous fluid flow; development of conservation laws, relevant boundary conditions and analytical solutions; introduction to numerical solutions.  
Prerequisites: GEOL 101 or GEOL 104; MATH 308; or approval of instructor.  

GEOP 475 Interpretation of Gravity and Magnetic Fields  
Credits 3. 3 Lecture Hours.  
Applications of potential theory in the interpretation of gravity and magnetic fields; analysis of geophysical anomalies produced by geologic structures and by variation in the physical properties of rocks; use of regional gradients, residual anomalies, higher derivatives and surfaces, line integrals and two and three dimensional models.  
Prerequisites: GEOL 312; MATH 251 or approval of instructor.  

GEOP 484 Internship  
Credits 0. 0 Other Hours.  
Directed internship in a private firm, government agency or non-governmental organization to provide work experience related to the student's degree program and career objectives. May be taken two times.  
Prerequisites: Junior or senior classification and approval of internship agency and approval of instructor.  

GEOP 485 Directed Studies  
Credits 1 to 12. 1 to 12 Other Hours.  
Advanced problems in geophysics.  

GEOP 491 Research  
Credits 0 to 4. 0 to 4 Other Hours.  
Research conducted under the direction of faculty member in geophysics. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.  
Prerequisites: Junior or senior classification and approval of instructor.  

GEOP 611 Geomechanics  
Credits 3. 3 Lecture Hours.  
Development of continuum mechanics and its application to rock deformation; stress, strain, stress equilibrium, constitutive relations; governing equations for elastic solids and viscous fluids formulated and used to solve elementary boundary-value problems which have application to structural geology and solid-state geophysics.  
Prerequisite: MATH 221 or equivalent.  

GEOP 615 Experimental Rock Deformation  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Results of laboratory testing of mechanical properties of rocks at high pressure and temperature; interaction of theoretical, experimental, petrofabric and field studies of rock deformations as applied to problems in structural geology, seismology and engineering; philosophy of experimentation, apparatus design, data interpretation and extrapolation.  
Prerequisite: GEOP 611 or GEOL 665 or approval of instructor.  

GEOP 620 Geophysical Inverse Theory  
Credits 3. 3 Lecture Hours.  
Inferences about Earth structure from geophysical data; explicit treatment of sparse and noisy observations; construction of smooth Earth models; linear inversion of marine magnetic anomalies from seafloor magnetization; smooth inversion of DC sounding data from electrical structure; seismic tomography and geodetic fault-plane reconstructions; advanced methods for nonlinear deterministic inversion.  
Prerequisite: Graduate classification.  

GEOP 622 Petroleum Seismology II  
Credits 4. 3 Lecture Hours. 2 Lab Hours.  
Sampling (wavefield sampling); F-K analysis (applications to dip filtering and migration); deconvolution (deterministic and predicative); velocity estimation and tomography (travel time inversion); imaging in time and depth (migration); Zoeppritz equations and AVO analysis.  
Prerequisite: GEOP 421 or approval of instructor.  

GEOP 628 Basin Architecture  
Credits 3. 3 Lecture Hours.  
Tectonic classification of basins; tectonic mechanisms responsible for basin formation: mechanical behavior of the lithosphere; subsidence; geophysical signatures of sedimentary basins; tectonic controls on sedimentation and basin filling; petroleum systems and basin-scale hydrologic systems.  
Prerequisite: Approval of instructor.  

GEOP 629 Seismic Interpretation  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Introduces the problem of converting seismic properties of reflection time, velocity, impedance, amplitude and phase to geologic parameters of lithology, structures and stratigraphy using both models and real data.  
Prerequisite: Approval of instructor.  

GEOP 631 Seismic Data Processing  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Methods used to image the Earth using seismic reflection data, including deconvolution, f-k filtering, velocity analysis and migration; processing software; emphasis on field data.  
Prerequisite: Graduate classification or approval of instructor.  

GEOP 651 Theoretical Seismology  
Credits 3. 3 Lecture Hours.  
Wave propagation in unbounded and bounded elastic media; seismic reciprocity and the elastodynamic representation theorem; radiation patterns from earthquake sources; body waves, Rayleigh waves, Stoneley waves, Love waves and Lamb waves; characteristic equation for surface waves in a layered half-space; dispersion and phase and group velocities; methods of stationary phase and steepest descents; Cagniard-deHoop technique; ray theory in an inhomogeneous earth; inversion of travel times; viscoelastic wave propagation; normal modes of vibration of the earth.  
Prerequisite: GEOP 652 or approval of the instructor. (Offered in alternate years.)
GEOP 652 Earthquake Seismology
Credits 3. 3 Lecture Hours.
Seismometry and earthquake precursors; mathematical theory of elasticity and its application to earthquake studies; dissipation of elastic energy; seismic sources; earthquake risk; free modes of the earth; discrimination between underground nuclear explosions and earthquakes.
Prerequisite: GEOP 421 or approval of instructor.

GEOP 655 Borehole Acoustic
Credits 3. 3 Lecture Hours.
Introduces propagation of acoustic waves in boreholes, with applications to petroleum exploration and comparisons to other waveguide phenomena in the earth sciences; survey of full waveform acoustic logging and influence of borehole modes for crosswell and vertical seismic profile experiments; exercised in data analysis with industry software.
Prerequisite: GEOP 421 or GEOP 652 or approval of instructor.

GEOP 660 Physics of the Earth's Interior
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Physics of the Earth's Interior. Structure, composition and physical state of the Earth's interior; constraints on models of the Earth imposed by seismic, gravity, heat flow, and electrical conductivity; thermodynamics and high pressure mineral physics; Earth's motion and deformation; rheology.
Prerequisite: Graduate classification.

GEOP 661 Reservoir Rock Physics
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Poroelasticity and electrodynamics of porous media; Biot Theory, Gassman fluid substitution and advanced rock physics models; relationships between seismic/electromagnetic properties and multiphase reservoir properties such as porosity, saturation, permeability, wettability, connectivity and other pore-structure parameters; computer-based rock physics modeling; application to reservoir characterization; time-lapse reservoir monitoring.
Prerequisite: Approval of instructor. (Spring, alternate years.)

GEOP 681 Seminar
Credit 1. 1 Lecture Hour.
Discussion of subjects of current importance.
Prerequisite: Graduate classification.

GEOP 685 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
For graduate students to undertake limited investigations not within their thesis or dissertation research and not covered in established curricula.
Prerequisites: Graduate classification and approval of instructor.

GEOP 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of geophysics. May be repeated for credit.
Prerequisites: Graduate classification and approval of instructor.

GEOP 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research toward thesis or dissertation.

Courses

GEOS 101 Introduction to the Geosciences
Credit 1. 1 Lecture Hour.
Introduction to the geosciences; geography, geology, geophysics, atmospheric sciences and oceanography; areas and opportunities in the various geoscience fields. Open to all freshman and sophomore non-geoscience students interested in geosciences.

GEOS 105 Introduction to Environmental Geoscience
Credits 3. 3 Lecture Hours.
Key concepts and generalizations of global environmental issues within an Earth systems science framework including climate change, air pollution, land and coastal degradation, water resources and pollution, and habitat loss; environmental ethics, economics and politics; environmental issues in Texas. Enrollment preference will be given to environmental geoscience and environmental studies majors.

GEOS 210 Climate Change
Credits 3. 3 Lecture Hours.
Examination of the science of climate change; how greenhouse gases warm the planet; scientific evidence that the earth is warming; scientific evidence that humans are causing this warming; what warming we can expect in the future and impacts of that warming.

GEOS 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Special Topics in ... Selected topics in an identified area of geosciences. May be repeated for credit.
Prerequisite: Approval of instructor.

GEOS 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in the College of Geosciences. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Freshman or sophomore classification and approval of instructor.

GEOS 301 College of Geosciences Study Abroad
Credits 1 to 18. 1 to 18 Other Hours.
For students in approved programs abroad. May be repeated for credit.
Prerequisites: Admission to approved program and approval of academic dean.

GEOS 401 Polar Regions of the Earth: Science, Society and Discovery
Credits 3. 3 Lecture Hours.
Overview of disciplines and topics that define modern polar science in the north and the south; includes history of the Polar Regions, polar geosciences, major polar scientific projects, and special topics; participate as individuals and teams in education, outreach and science projects.
Prerequisite: Junior or senior classification.

GEOS 405 Environmental Geosciences
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Dynamics and human interactions with near-surface environments including land, atmosphere and oceans through problem-based learning; interdisciplinary environmental problem topic, for example, water quality, urbanization, coastal development, or environmental pollution; geoscience techniques used for monitoring human-geosphere interaction.
Prerequisites: GEOS 105; junior or senior classification.

GEOS - Geosciences
GEOS 410 Global Change
Credits 3. 3 Lecture Hours.
The interaction of the earth, atmosphere, oceans, cryosphere and life, including the impact of human society on the environment and climate; global change modeling; politics, policy and decision making; and personal awareness.
Prerequisite: Junior or senior classification.

GEOS 430 Global Science and Policy Making
Credits 3. 3 Lecture Hours.
Policy making derived from global science and technology; how advice is communicated to the federal government and the public; current and future societal concerns that could affect future policy making; knowledge and information used to set priorities, decide budget allocations, and establish public policy.
Prerequisite: Junior or senior classification or approval of instructor.

GEOS 442/GEOG 442 Past Climates
Credits 3. 3 Lecture Hours.
Terrestrial and marine proxy records of past climate variability, including tree rings, coral, and sediments; past climate change events such as the Little Ice Age and Medieval Warm Period; greenhouse gases and global temperature; insight into the nature of climate change and challenges humankind faces in the next few centuries.
Prerequisites: ATMO 201, or GEOG 203, or GEOL 101, or GEOL 104, or OCNG 251; junior or senior classification.
Cross Listing: GEOG 442/GEOS 442.

GEOS 444 The Science and Politics of Global Climate Change
Credits 3. 3 Lecture Hours.
Examination of the policy and scientific debate over climate change; how scientific debates produce “knowledge”; how political debates produce policies; how policy debates use science; scientific evidence for climate change; impacts of climate change; possible responses to climate change; the political debate over climate change.
Prerequisite: One semester of physics or one science core course.

GEOS 470 Data Analysis Methods in Geosciences
Credits 3. 3 Lecture Hours.
Research methods from conceptualization of a scientific problem to data collection, analysis, and visualization; basic data analysis methodologies in the geosciences; emphasis on real-world applications from environmental, atmospheric, and oceanographic sciences.
Prerequisites: Junior or senior classification; MATH 151 and STAT 303 or concurrent enrollment, or approval of instructor.

GEOS 481 Seminar
Credit 1. 1 Other Hour.
Acquaint students with current research themes in the environmental field. May be repeated 4 times for credit.
Prerequisite: Junior or senior classification.

GEOS 484 Internship
Credits 0 to 6. 0 to 6 Other Hours.
Provides opportunity to gain practical experience in a working situation either during the semester or summer; work experience must have relevance to the degree sought and/or career objectives.
Prerequisite: Junior or senior classification and approval of internship agency and departmental director.

GEOS 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Advanced problems in geosciences.

GEOS 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of geosciences. May be repeated for credit.

GEOS 491 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of a faculty member in the College of Geosciences. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor.

GEOS 601 Polar Regions of the Earth: Science, Society, and Discovery
Credits 3. 3 Lecture Hours.
Disciplines and topics that define modern polar science in the north and south; includes history of the Polar Regions, polar geosciences, major polar scientific projects, and special topics; participate as individuals and teams in education, outreach and science projects.
Prerequisite: Graduate classification.

GEOS 642/GEOG 642 Past Climates
Credits 3. 3 Lecture Hours.
Terrestrial and marine proxy records of past climate variability, including tree rings, coral, and sediments; past climate change events such as the Little Ice Age and Medieval Warm Period; greenhouse gases and global temperature; insight into the nature of climate change and challenges humankind faces in the next few centuries.
Prerequisite: Graduate Classification.
Cross Listing: GEOG 642/GEOS 642.

GEOS 677 Science, Technology, Engineering and Mathematics (STEM) Teaching Professional Development
Credit 1. 1 Lecture Hour.
Center for Teaching Excellence (CTE) consultation and faculty mentoring in STEM teaching; course topic and syllabus design; learning outcomes and assessment; teaching methodology; reflection on teaching philosophy; reflection on teaching as research. Must be taken on satisfactory/unsatisfactory basis.
Prerequisites: Graduate classification and approval of instructor.
Cross Listing: ENGR 677 and SCEN 677.

GEOS 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of geosciences. May be repeated for credit.
Prerequisites: Graduate classification and approval of instructor.

GERM - German

Courses

GERM 101 Beginning German I
Credits 4. 3 Lecture Hours. 2 Lab Hours.
(GERM 1411, 1511) Beginning German I. Elementary language study with oral, written and reading practice. Preparation for conversation. Part of class preparation will be done in language laboratory.

GERM 102 Beginning German II
Credits 4. 3 Lecture Hours. 2 Lab Hours.
(GERM 1412, 1512) Beginning German II. Continuation of GERM 101. Part of class preparation will be done in language laboratory.
Prerequisite: GERM 101.
GERM 201 Intermediate German I
Credits 3.3 Lecture Hours.
Prerequisite: GERM 102.

GERM 202 Intermediate German II
Credits 3.3 Lecture Hours.
(GERM 2312) Intermediate German II. Continuation of GERM 201 with more advanced material. Some literary selections included in class readings.
Prerequisite: GERM 201.

GERM 221 Field Studies I
Credits 3.3 Other Hours.
German language and culture taught in Germany; supervised travel of cultural interest; living with local families; participation in the activities and courses of a German university or institute; written and oral reports, exams; to be taken concurrently with GERM 222.
Prerequisite: GERM 102 with a grade of B or higher.

GERM 222 Field Studies II
Credits 3.3 Other Hours.
German language and literature taught in Germany in cooperation with a German university or institute; exams, written reports; to be taken concurrently with GERM 221.
Prerequisite: GERM 102 with a grade of B or higher.

GERM 285 Directed Studies
Credits 1 to 4, 1 to 4 Other Hours.
Individual supervision of readings or assigned projects in German, selected for each student individually.
Prerequisite: Approval of instructor and department head.

GERM 289 Special Topics in...
Credits 1 to 4, 1 to 4 Lecture Hours.
Selected topics in an identified area of German. May be repeated for credit.
Prerequisite: Approval of instructor.

GERM 301 Composition
Credits 3.3 Lecture Hours.
Development of writing skills in German; emphasis on grammatical construction; taught in German.
Prerequisite: GERM 202 or GERM 222.

GERM 311 Conversation
Credits 3.3 Lecture Hours.
Development of effective communication skills in spoken German, with emphasis on language appropriate to various social context; taught in German.
Prerequisite: GERM 202 or GERM 222.

GERM 315 Literary Investigations: German Short Fiction
Credits 3.3 Lecture Hours.
Readings of selected works of short prose from the early 20th century to the present with emphasis on principles of literary analysis; conducted in German.
Prerequisite: GERM 202 or GERM 222.

GERM 316 Advanced Business German
Credits 3.3 Lecture Hours.
Continuation of GERM 203; reading and oral practice of German pertinent to business, trade and international commerce.
Prerequisite: GERM 202 or GERM 222.

GERM 321 German Culture and Civilization I
Credits 3.3 Lecture Hours.
German culture and civilization from classical antiquity to 1830; major stylistic periods in literature and the fine arts; conducted in German.
Prerequisite: GERM 202 or GERM 222.

GERM 322 German Culture and Civilization II
Credits 3.3 Lecture Hours.
German culture and civilization from 1830 to the present; conducted in German.
Prerequisite: GERM 202 or GERM 222.

GERM 331 German Literary Expression I
Credits 3.3 Lecture Hours.
Readings of selected drama, poetry, and prose works of German literature from the Middle Ages through Romanticism; problems involved in defining dramatic, lyric, and epic genres considered; structural and aesthetic elements of literary works; conducted in German.
Prerequisite: GERM 310 or GERM 315, or registration therein.

GERM 332 German Literary Expression II
Credits 3.3 Lecture Hours.
Readings of selected drama, poetry, and prose works of German literature of the modern era; problems involved in defining dramatic, lyric, and epic genres considered; structural and aesthetic elements of literary works; conducted in German.
Prerequisite: GERM 310 or GERM 315, or registration therein.

GERM 333 Contemporary Germany
Credits 3.3 Lecture Hours.
Social, political, and economic debates and issues in Germany from 1945 to the present through the arts (literature, film, video, music); focus on post-war reconstruction, divided Germany, and post-reunification periods; conducted in German.
Prerequisites: GERM 310 or GERM 315, or registration therein.

GERM 334 German Drama
Credits 3.3 Lecture Hours.
Study, analysis and public presentation in German of a major German dramatic work; literary theory and intensive conversational practice combined with skills of language acquisition within a performance setting.
Prerequisite: GERM 310 or GERM 315, or registration therein.

GERM 336 German Fairy Tales
Credits 3.3 Lecture Hours.
Introduction to and study of fairy tales and children's literature through German tradition in these forms; reception of fairy tales through adaptation and modernization; taught in German.
Prerequisite: GERM 310 or GERM 315, or registration therein.

GERM 362 The Weimar Republic: Literature and Culture
Credits 3.3 Lecture Hours.
Film, theater and poetry in the turbulent era prior to the Nazi terror; conducted in German.
Prerequisite: GERM 310 or GERM 315, or registration therein.

GERM 410 Seminar in German Literature and Culture
Credits 3.3 Lecture Hours.
Survey of major literary and intellectual landmarks of a period in German history (Enlightenment, Romanticism, High Modernism, post-1945); study of literary works in context of social and cultural history, with attention to Germany's particular place in Europe and the world; taught in German. May be taken two times.
Prerequisite: 6 hours in GERM at 300-level, or approval of instructor.
GERM 411 German Author and Genre Studies
Credits 3. 3 Lecture Hours.
Examination of the work of a specific author, such as Goethe, Schiller, Kafka, Brecht, Frisch, or Grass, or the diachronic study of a specific genre, e.g., poetry, drama, prose; taught in German. May be taken two times.
Prerequisite: 6 hours in GERM at 300-level, or approval of instructor.

GERM 432/EURO 432 Music in German Culture
Credits 3. 3 Lecture Hours.
Examination of the role of music in German cultural and national self-definition from the 18th century to the present; the political and ideological role of music; study of genres and media including opera, art song, Singspiel, protest songs and film.; taught in English.
Prerequisite: GERM 202 or registration therein or approval of instructor.
Cross Listing: EURO 432/GERM 432.

GERM 434 Martin Luther and the Reformation in Germany
Credits 3. 3 Lecture Hours.
The life and thought of Martin Luther; study of the Protestant Reformation in Germany from theological, political, and social perspectives; taught in English.
Prerequisite: GERM 202 or registration therein or approval of instructor.

GERM 435/FILM 435 German Film
Credits 3. 3 Lecture Hours.
Consideration and analysis of major works and directors of German film; interpretation of culture through film; relationship of film to history, literature, and other arts; taught in English. May be repeated for credit.
Prerequisites: Junior or senior classification, or approval of instructor.
Cross Listing: FILM 435/GERM 435.

GERM 437 German Romanticism: Literature, Theory, Philosophy
Credits 3. 3 Lecture Hours.
From Goethe's "Faust" to the romantic exaltation of poetry; influence of the romantic movement on European literary theory and philosophy; taught in English.
Prerequisite: GERM 202 or registration therein, or approval of instructor.
Cross Listing: EURO 437/GERM 437.

GERM 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Individual supervision of readings or assigned projects, selected for each student individually; written and oral reports.
Prerequisite: Approval of instructor and department head.

GERM 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of German. May be repeated for credit.
Prerequisite: Approval of instructor.

GERM 491 Research
Credits 1 to 3. 1 to 3 Other Hours.
Research conducted under the direction of faculty member in German. May be taken three times for credit.
Prerequisites: Junior or senior classification and approval of department head.

GERM 603 Introduction to Scientific German
Credits 3. 3 Lecture Hours.
Intensive course to prepare graduate students to read scientific material; technical vocabulary and translation. May not count for hours in a supporting field.
Prerequisite: Graduate classification.

GERM 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed individual study of selected problems in the field of German.
Prerequisite: Approval of department head.

GERM 692 Readings
Credits 3. 3 Lecture Hours.
Readings in German literary texts in the original language.
Prerequisite: Graduate classification.

HBRW - Hebrew

Courses

HBRW 101 Elementary Modern Hebrew I
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Elementary language study with oral, written and reading practice; preparation for conversation; part of class preparation to be done in the language laboratory.

HBRW 102 Elementary Modern Hebrew II
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Continuation of HBRW 101; part of class preparation to be done in the language laboratory.
Prerequisite: HBRW 101.

HBRW 285 Directed Studies
Credits 0 to 3. 0 to 3 Other Hours.
Individual supervision of readings or assigned projects in Hebrew, selected for each student individually.
Prerequisites: Approval of instructor and department head.

HBRW 289 Special Topics In...
Credits 3. 3 Lecture Hours.
Selected topics in an identified area of Hebrew studies. May be repeated for credit.
Prerequisite: Approval of instructor.

HEFB - Health Ed Field Based

Courses

HEFB 222/KNFB 222 Teaching and Schooling in Modern Society
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Developing an understanding of students in multiple settings and levels; development, structure, history, finance, and management of schools in a democratic society; philosophical, ethical and moral dimensions of teaching; professional role of teacher.
Prerequisites: Junior or senior classification; majors only.
Cross Listing: KNFB 222/HEFB 222.

HEFB 324 Technology and Teaching Skills for the 21st Century Learner
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Preparation of future Health and Physical Education teachers with practical skills related to: technology in the classroom/gymnasium, strategies for addressing urban education and English language learners, liability, management and classroom discipline, development of professional communication skills and time management; includes field based experiences in diverse classroom settings.
Prerequisites: HEBF 222/KNFB 222; junior or senior classification; admission to professional phase of program.
HEFB 325/KNFB 325 Introduction to Secondary School Teaching  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Introduce fundamental teaching skills and theories necessary for preparing  
reflective teachers; examine classroom management, learning strategies  
and assessment techniques; classroom lectures combined with field- 
based experiences to link theory into practice.  
Prerequisites: HEFB 324; admission to the professional phase of  
program; junior or senior classification.  
Cross Listing: KNFB 325/HEFB 325.

HEFB 450/KNFB 450 Supervised Student Teaching  
Credits 6. 0 Lecture Hours. 6 Other Hours.  
Observation and participation in an accredited public school classroom;  
techniques of teaching student’s teaching fields, and appropriate  
instructional strategies for assigned student population.  
Prerequisites: Admission to professional phase of program and to student  
teaching; junior or senior classification.  
Cross Listing: KNFB 450.

**HISP - Hispanic Studies**

**Courses**

**HISP 201 Current Issues in Hispanic Studies**  
Credit 1. 1 Lecture Hour.  
Exploration of current issues and concerns in Hispanic Studies through  
attendance and participation in Hispanic Studies-related events and  
lectures by noted academics and professionals in Hispanic Studies; in-  
class discussions. May be taken three times for credit. Must be taken on a  
satisfactory/unsatisfactory basis.  
Prerequisite: ENGL 104.

**HISP 204 Spanish and Spanish American Literature in Translation**  
Credits 3. 3 Lecture Hours.  
Survey of literature from the Spanish-speaking world from the Middle  
Ages to the present; English translations of masterpieces of Spanish  
language literature; authors such as Cervantes, Lope de Vega, Dario,  
Garcia Marquez. Taught in English.

**HISP 205 Don Quixote and the Other Arts**  
Credits 3. 3 Lecture Hours.  
A study of Miguel de Cervantes’ masterwork, Don Quixote, and its  
representations in other arts such as painting, film and music. Taught in English.

**HISP 206 Food in the Hispanic World**  
Credits 3. 3 Lecture Hours.  
A study of food, food preparation and consumption in the Hispanic world  
from historical, geographical, artistic, social and psychological perspective.  
Taught in English.

**HISP 250 Contemporary Spanish Culture**  
Credit 1. 1 Lecture Hour.  
Cultural and practical orientation for students participating in the summer  
study abroad programs in Spain; brief introduction to contemporary social  
and cultural institutions; discussions of Spanish university system; oral  
reports and final paper; readings and discussion in English and Spanish.  
Prerequisite: SPAN 101 or equivalent.

**HISP 260 Contemporary Mexican Culture**  
Credit 1. 1 Lecture Hour.  
Introduction to contemporary Mexican social, cultural, and political  
institutions; discussion of Mexican university system; readings and  
discussion in Spanish and English. For preparation for study abroad  
program in Mexico.  
Prerequisite: SPAN 101 or equivalent.

**HISP 285 Directed Studies**  
Credits 0 to 3. 0 to 3 Other Hours.  
Individual supervision of readings or assigned projects in Hispanic studies,  
selected for each student individually.  
Prerequisites: Approval of instructor and department head.

**HISP 289 Special Topics In...**  
Credits 3. 3 Lecture Hours.  
Selected topics in an identified area of Hispanic studies. May be taken  
three times for credit.  
Prerequisites: ENGL 104; freshman or sophomore classification;  
approval of department head.

**HISP 291 Research**  
Credits 0 to 3. 0 to 3 Other Hours.  
Research in Hispanic studies conducted under the direction of faculty  
member. May be taken two times for credit.  
Prerequisites: freshman or sophomore classification and approval of  
instructor.

**HISP 352 Hispanic Literature and Film**  
Credits 3. 3 Lecture Hours.  
The language of film, and film as fiction; the relationship between film and  
literature; films as expressions of cultural realities through the adaptation  
of Hispanic literary works; readings and lectures in English.

**HISP 362/ENGL 362 Latino/a Literature**  
Credits 3. 3 Lecture Hours.  
Literature by U.S.-based Latino/a authors writing mostly in English;  
examination of historical and social contexts of cultural production; may  
include novels, poetry, short stories, plays, and films to gain understanding  
of aesthetic expression of diverse Latino/a authors, including but not  
limited to Mexican Americans, Puerto Ricans, Cuban Americans and  
Dominican Americans.  
Prerequisite: Junior or senior classification.  
Cross Listing: ENGL 362/HISP 362.

**HISP 363 Borderlands: U.S. and Mexico**  
Credits 3. 3 Lecture Hours.  
Multiple images of the U.S./Mexico border, their creation, their evolution,  
and their conflicting representations in filmic, literary and musical texts.  
Prerequisites: ENGL 104 and junior or senior classification.

**HISP 364/RELS 364 Diversity Lessons from Medieval Spain**  
Credits 3. 3 Lecture Hours.  
Crucible of cultures--Christian, Jewish, and Muslim--that was medieval  
Spain and modern implications of that experience in diversity.  
Prerequisites: ENGL 104 and junior or senior classification.  
Cross Listing: RELS 364/HISP 364.
HISP 371/RELS 371 Hispanic Religions  
Credits 3.3 Lecture Hours.  
Exploration of the history and practice of Hispanic religion, including spirit possession, evil eye, consumption of sacred substances, healing traditions, ex-votos, relics, prophecy, omens, monsters, astrology, witchcraft, the Inquisition, festivals, pilgrimage, mystics and religious contributions of diverse ethnic groups.  
Prerequisite: Junior or senior classification or approval of instructor.  
Cross Listing: RELS 371/HISP 371.  

HISP 485 Directed Studies  
Credits 0 to 3. 0 to 3 Other Hours.  
Individual supervision of readings or assigned projects in Hispanic studies, selected for each student individually.  
Prerequisites: Junior or senior classification; approval of instructor and department head.  

HISP 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified area of hispanic studies. May be taken three times for credit.  
Prerequisites: ENGL 104; junior or senior classification; approval of department head.  

HISP 600 Introduction to Hispanic Studies  
Credits 3.3 Lecture Hours.  
Interdisciplinary review of linguistic, literary, theoretical, cultural, historical and socio-economic issues of the Hispanic world; study of the mechanics and ethics of scholarly procedure and bibliographical guidance on original research; Spanish-language writing practicum.  
Prerequisite: Graduate classification.  

HISP 602 Spanish Applied Linguistics  
Credits 3.3 Lecture Hours.  
Current linguistic research that investigates real-world issues related to Spanish language use and the acquisition of Spanish as a second language.  
Prerequisite: HISP 600.  

HISP 603 Development of the Spanish Language  
Credits 3.3 Lecture Hours.  
The origin and development of the Spanish language from pre-Roman to modern period with emphasis on the socio-historical contexts; analysis of literary and documentary evidence of linguistic evolution.  
Prerequisite: HISP 602 or approval of instructor.  

HISP 605 Spanish for Reading and Translation  
Credits 3.3 Lecture Hours.  
Lexical and grammatical study and practice for the acquisition of research-practical reading and translation competence in Spanish; for graduate students needing foreign language reading competence; taught in English.  
Prerequisite: Graduate classification.  

HISP 606 Spanish in the United States  
Credits 3.3 Lecture Hours.  
In-depth description and analysis of Spanish varieties spoken in the United States, by both traditional and new immigrant populations, including New Mexico and Louisiana Spanish, Mexican, Cuban, Puerto Rican, Dominican, Central and South American dialects; topics include accommodation, koinéization, borrowing, code-switching, attitudes and policies related to language maintenance and shift.  
Prerequisite: Graduate classification.  

HISP 607 Seminar in Spanish Linguistics  
Credits 3.3 Lecture Hours.  
Intensive investigation of an issue important to understanding historical linguistics, dialectology, sociolinguistics, developments in theoretical and applied linguistics. May be taken three times for credit as content varies.  
Prerequisite: Graduate classification.  

HISP 614 Spanish Dialectology  
Credits 3.3 Lecture Hours.  
Analysis of regional linguistic variation from a synchronic and diachronic perspective; topics include varieties spoken in Spain, the Americas, and worldwide; dialect diversification, contact varieties, Spanish-based pidgins and creoles.  
Prerequisite: Graduate classification.  

HISP 618 Hispanic Traditional and Popular Culture and Religion  
Credits 3.3 Lecture Hours.  
Comprehensive examination of theories of criticism and their application to the study of literature and culture.  
Prerequisite: Graduate classification.  

HISP 620 Studies in Critical Theory  
Credits 3.3 Lecture Hours.  
Study of the literary production of Latin America from colonial times to the present; topics may include colonial literature, Romanticism, Modernism, the novel of the Mexican Revolution, contemporary trends in the Latin American novel, Afro-Hispanic literature, Hispanic Caribbean literature. May be taken three times for credit.  
Prerequisite: Graduate classification.  

HISP 625 U.S. Hispanic Literature and Culture  
Credits 3.3 Lecture Hours.  
Study of the origins and evolution of U.S. Hispanic literature, culture and folklore, and U.S. Hispanic regional dialects.  
Prerequisite: Graduate classification.  

HISP 630 Seminar in Latin American Literature  
Credits 3.3 Lecture Hours.  
Study of cultural and ideological currents as reflected in Spanish literature; topics may include Spain and European culture, European thought in Latin America, the Renaissance in Spanish literature and society, Spain and Western tradition, national identity, U.S. Hispanic nationalism. May be taken three times for credit.  
Prerequisite: Graduate classification.  

HISP 640 Seminar in History of Ideas in the Hispanic World  
Credits 3.3 Lecture Hours.  
Study of cultural and ideological currents as reflected in Spanish literature; topics may include Spain and European culture, European thought in Latin America, the Renaissance in Spanish literature and society, Spain and Western tradition, national identity, U.S. Hispanic nationalism. May be taken three times for credit as content varies.  
Prerequisite: Graduate classification.  

HISP 645 Hispanic Women Writers  
Credits 3.3 Lecture Hours.  
A study of the development of writing by women in the Hispanic world, including Spain, Latin America, and the United States. Topics include identity and nation, building of a feminine aesthetics, the reception of women writers, literary canons and exclusion, women and/in the Latin American boom, Latina writers in the United States.  
Prerequisite: Graduate classification.
HISP 646 Seminar in Cultural Encounters and Borders
Credits 3. 3 Lecture Hours.
Study of cultural encounters across borders in geography, language, society, gender and genre. May be taken three times for credit as content varies.
Prerequisite: Graduate classification.

HISP 650 Research Methods in Linguistics
Credits 3. 3 Lecture Hours.
Examination of various methods of linguistics research and their application to issues in Hispanic linguistics; quantitative data collection (questionnaires, surveys, corpora) and statistical analysis; qualitative methods (ethnographic interviews, focus groups) and discourse analysis; mixed methods and triangulation.
Prerequisite: Graduate classification.

HISP 653 Don Quixote and the Hispanic Novel
Credits 3. 3 Lecture Hours.
Don Quixote and the development of modern fiction, its influence in the Hispanic narrative tradition, from Fernández de Avellaneda to Pérez Galdós, G. García Márquez, and Carlos Fuentes, and presence in the U.S. Hispanic novel.
Prerequisite: Graduate classification.

HISP 660 Seminar in Hispanic Cultural Studies
Credits 3. 3 Lecture Hours.
Intensive study and research on specialized subjects in cultural studies. May be taken three times for credit as content varies.
Prerequisite: Graduate classification.

HISP 664 Seminar in Hispanic Theater
Credits 3. 3 Lecture Hours.
Study of Peninsular, Latin American, U.S. Hispanic, Afro-Hispanic theater and performance. May be taken three times for credit as content varies.
Prerequisite: Graduate classification.

HISP 665 Seminar in Spanish Literature
Credits 3. 3 Lecture Hours.
Study of Peninsular literary periods, genres and authors from medieval to contemporary times. May be taken three times for credit as content varies.
Prerequisite: Graduate classification.

HISP 667 Seminar in Hispanic Genre Studies
Credits 3. 3 Lecture Hours.
Study of selected topics in the works, characteristics and classifications of a given genre cultivated by Hispanic writers. May be taken three times for credit as content varies.
Prerequisite: Graduate classification.

HISP 668 Modern Latin American Poetry from 1850-2010
Credits 3. 3 Lecture Hours.
Study of poetry in Latin America between 1850 and 2010 with particular emphasis on "poesía gauchesca," Romanticism, Modernism and avant-garde, along with neobaroque, barrococó, language poetry and cybertextual poetry.
Prerequisite: Graduate classification.

HISP 670 Seminar in U.S. Hispanic Literature
Credits 3. 3 Lecture Hours.
Study of the literary production of U.S. Hispanic authors; topics may include bilingual literature, Nuyorican literature, Cuban American literature, Chicano literature, the immigrant novel, ethnic autobiography, U.S. Hispanic theater, Chicano theater. May be taken three times for credit as content varies.
Prerequisite: Graduate classification.

HISP 671 Bilingualism in the Spanish-speaking World
Credits 3. 3 Lecture Hours.
Linguistic, psycholinguistic, and social aspects of bilingualism and multilingualism with special reference to Spanish and the United States; bilingual speakers and bilingual acquisition; bilingual communities: language identity, language maintenance and shift; implications for education and society; written and oral manifestations of bilingualism in the media and arts.
Prerequisite: Graduate classification.

HISP 672 Hispanic Film and Performance Arts
Credits 3. 3 Lecture Hours.
Theoretical and historical exploration of cinema and performance arts in the Hispanic world: description and interpretation of films and performance arts such as flamenco and folkloric ballet with particular attention to history, ethnology, artistic trends and tendencies, and relationship to other arts.
Prerequisite: Graduate classification.

HISP 675 Spanish Language Teaching Methods
Credits 3. 3 Lecture Hours.
Overview of the current language methodology as it applies to the teaching of Spanish to native and non-native speakers, pedagogical and professional issues related to teaching Spanish at the college level.
Prerequisite: Graduate classification and approval of instructor.

HISP 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed individual study of selected problems in the field of Hispanic linguistics, literature or culture.

HISP 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of Hispanic linguistics, literature, or culture. May be repeated for credit.
Prerequisite: Approval of instructor.

HISP 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Theory and research credit given only upon acceptance of completed thesis.
Prerequisite: Twelve hours of advanced courses in Hispanic studies.

HIST - History

Courses

HIST 101 Western Civilization to 1660
Credits 3. 3 Lecture Hours.
(HIST 2311) Western Civilization to 1660. Ancient civilizations, Greek, Roman and Asian; Christianity; medieval civilization in west, eastern Europe; political, social and intellectual developments from earliest human cultures to 1660.

HIST 102 Western Civilization Since 1660
Credits 3. 3 Lecture Hours.
(HIST 2312) Western Civilization Since 1660. Religious, dynastic and imperial developments; Industrial Revolution; western democracies; rise of nationalism and communism; central and eastern Europe; intellectual revolution; World Wars I and II and the contemporary world.

HIST 103 World History to 1500
Credits 3. 3 Lecture Hours.
(HIST 2321) World History to 1500. Development of major world societies in the premodern era; emergence of agrarian-based modes of production, political states, religious economy and a global division of systems; Eurasian world system and the civilizations of Africa and the Americas.
HIST 104 World History Since 1500
Credits 3.3 Lecture Hours.
(HIST 2322) World History Since 1500. Interaction of major world societies in the modern era; emergence of the modern world-economy and a global division of labor; European imperialism and colonialism and reactions in Africa, Asia and Latin America.

HIST 105 History of the United States
Credits 3.3 Lecture Hours.
(HIST 1301) History of the United States. Colonial heritage; Revolution; adoption of Constitution; growth of nationalism and sectionalism; Civil War; Reconstruction.

HIST 106 History of the United States
Credits 3.3 Lecture Hours.
(HIST 1302) History of the United States. Since reconstruction; new social and industrial problems; rise of progressivism; U.S. emergence as a world power; World War I; reaction and New Deal; World War II; contemporary America.

HIST 210 Russian Civilization
Credits 3.3 Lecture Hours.
Russian history, culture and society from origins to the present; rise of the Russian Empire; autocracy; modernization without liberalization; reforms, reaction, revolution; development of Communist regime; continuity from Imperial to Soviet period in industrialization, bureaucracy and treatment of peasants, nationalities and intellectual opposition; Gorbachev and a new revolution.

HIST 213 History of England
Credits 3.3 Lecture Hours.
(HIST 2313) History of England. British, Saxon and Norman origins; national development; struggles between church and state; crown and nobles; nobles and commons; development of parliament.

HIST 214 History of England
Credits 3.3 Lecture Hours.
(HIST 2314) History of England. Agrarian and Industrial Revolutions; relations with Ireland; evolution of democracy; struggles with France and Napoleon; social legislation in the 20th century; growth of Empire until World War II.

HIST 220 History of Christianity: Origins to the Reformation
Credits 3.3 Lecture Hours.
History of Christian doctrine, ecclesiastical organization, and religious practice, origins through Reformation, with emphasis on religion and society; life and teachings of Jesus; apostolic church; patristic period; Christianization of Roman Empire and northern Europe; monasticism; medieval church; Gregorian reform; heresy; papal monarchy; schism and conciliarism; reformations of the sixteenth century.

Cross Listing: CLAS 220 and RELS 220.

HIST 221/RELS 221 History of Islam
Credits 3.3 Lecture Hours.
Introduction to the history of Islam, from the origins of the religion to the present; development of Islamic law; gender issues; expansion of Islam to Sub-Saharan Africa and South Asia; globalized Islam.

Cross Listing: RELS 221/HIST 221.

HIST 226 History of Texas
Credits 3.3 Lecture Hours.
(HIST 2301) History of Texas. History of Texas from Spanish period to present day. Stress placed upon period of Anglo-American settlement, revolution, republic and development of modern state.

HIST 230 American Military History, 1609 to Present
Credits 3.3 Lecture Hours.
Main events, personalities and technologies related to American military history.

HIST 232 History of American Sea Power
Credits 3.3 Lecture Hours.
Development of American sea power from the 18th century to the present.

HIST 234 European Military History, 1630-1900
Credits 3.3 Lecture Hours.
European military history from Gustavus Adolphus to the Boer War including especially societal involvement as well as roles of classic commanders.

HIST 238 American Indian History
Credits 3.3 Lecture Hours.
Survey of American Indian history; Pre-Columbian, First Contact, Colonial Conquest, Differentiation between cultural groups; Reservation period, twentieth-century self-determination, and Pan-Indianism.

HIST 280 The Historian’s Craft
Credits 3.3 Lecture Hours.
The Historian’s Craft. The world of the professional historian; meanings and uses of history; current debates; archival research; evidence and argumentation; principles and methods of the analytical narrative.

HIST 300/AFAST 300 Blacks in the United States, 1607-1877
Credits 3.3 Lecture Hours.
Blacks in the United States from the colonial period to 1877; the slave trade, slavery, free blacks and the impact of the Civil War and Reconstruction on blacks.

Prerequisite: Junior or senior classification.

Cross Listing: AFST 300/HIST 300.

HIST 301/AFAST 301 Blacks in the United States Since 1877
Credits 3.3 Lecture Hours.
Blacks in the United States from the end of Reconstruction to the present; the ideologies of black leaders, disfranchisement, lynching and the quest for equality in the 1950s and 1960s.

Prerequisite: Junior or senior classification.

Cross Listing: AFST 301/HIST 301.

HIST 302 Women and War in the African Diaspora
Credits 3.3 Lecture Hours.
Case studies of women and war in the African diaspora in a wide historical and comparative context; social, economic, and cultural influence of war on women’s lives; women as victims, combatants, and refugees; historical construction of race, ethnic and gender identity during times of conflict.

Prerequisite: Junior or senior classification.

HIST 304 Mexican-American Frontier to 1848
Credits 3.3 Lecture Hours.
Origins and development of Spanish and Mexican history of Greater Southwest; exploration and conquest; Spanish entradas into Southwest; rise of institutions and colonial society; economic history; Mexican independence; Mexico’s far northern frontier, 1821-1848.

Prerequisite: Junior or senior classification.

HIST 305 Mexican-American History 1848-Present
Credits 3.3 Lecture Hours.
Social, economic and political evolution of Mexican Americans from 1848 to present; adaptation to a harsh and isolated frontier; land tenure systems; conflict in the new Southwest; change and continuity in society; immigration and settlement of Mexicans; emergence of various political movements; current issues.
HIST 307 Latino Communities of the U.S.
Credits 3.3 Lecture Hours.
Hispanic or “Latino” communities of 20th century U.S.: Mexican Americans, Puerto Ricans, Cubans and Central Americans; differences in historical experiences; role of race, class, and gender; cultural identity as expressed in art, literature, folklore and religion; contemporary social, political, and economic issues.

Prerequisite: Junior or senior classification.

HIST 308 History of American Indians in the U.S. South
Credits 3.3 Lecture Hours.
Examination of the role of indigenous populations in the history and formation of the U.S. South; cultural values and social practices; impact of European exploration and African slavery; trade patterns, imperial wars, and removal policies.

Prerequisite: Junior or senior classification.

HIST 319 U.S. Immigration and Ethnicity
Credits 3.3 Lecture Hours.
The sources and persistence of ethnic identity in 19th and 20th century America; its interaction with religion, politics, languages, education and social mobility; various nativist and anti-immigrant movements; contrasts and continuities between contemporary immigration patterns and those of earlier eras.

Prerequisite: Junior or senior classification.

HIST 320 History of the Atlantic World
Credits 3.3 Lecture Hours.
Introduction to the comparative study of the civilizations and cultures that bordered on the Atlantic Ocean; examination of culture and economic exchanges and adaptations, migrations, empire-building, and the emergence of new societies and cultures.

Prerequisite: Junior or senior classification.

HIST 321 The Age of Revolution in the Atlantic World
Credits 3.3 Lecture Hours.
Origins and events of the revolutions that transformed the Atlantic empires of Great Britain, France, and Spain in the late eighteenth and nineteenth centuries; disruption of old political and economic orders; creation of independent states in the Americas.

Prerequisite: Junior or senior classification.

HIST 322 History of the Iberian World
Credits 3.3 Lecture Hours.
Introduction to the people and places of the Iberian World, ca. 1500-1900; social, political and economical relations between Spain, Portugal, Asia and the Americas; emergence of a shared culture and cross-cultural exchange.

Prerequisite: Junior or senior classification.

HIST 325 Texas Cultural History
Credits 3.3 Lecture Hours.
The image of Texas history, tradition and popular culture from the 19th century to the present.

Prerequisite: HIST 226 or ANTH 201, ANTH 210 or ANTH 229.

HIST 326 History of the Caribbean to Emancipation
Credits 3.3 Lecture Hours.
History of the Caribbean region from human settlement to the late nineteenth century; indigenous peoples; European colonization; colonial societies; challenges to the imperial plantation model.

Prerequisite: Junior or senior classification.

HIST 327 History of the Caribbean Since Emancipation
Credits 3.3 Lecture Hours.
History of the Caribbean region from the late nineteenth century to the present; links to earlier plantation societies; economic, cultural, social, and political developments.

Prerequisite: Junior or senior classification.

HIST 330 Women in Ancient Greece and Rome
Credits 3.3 Lecture Hours.
Survey of women in classical Greece and Rome; emphases on female occupations and family relationships, legal and political status, traditional values, notorious women, how women were viewed and how they viewed themselves.

Prerequisite: Junior or senior classification.

Cross Listing: CLAS 330 and WGST 330.

HIST 331 Medieval Europe, 300 to 1300
Credits 3.3 Lecture Hours.
European political and diplomatic history from Constantine to Philip the Fair; emergence of medieval institutions; the influence of Plato and Aristotle upon Augustine, Abelard and Thomas Aquinas, and the origins of European education and law.

HIST 332 Renaissance and Reformation Europe, 1300 to 1660
Credits 3.3 Lecture Hours.
Renaissance politics and diplomacy; political ideas of Erasmus and Machiavelli; art and humanism of the Renaissance; religious views of Luther, Calvin and Zwingli; the “new” economics.

HIST 333 Europe in the Age of Absolutism, 1660-1815
Credits 3.3 Lecture Hours.
Europe from the “Age of Louis XIV” to the Congress of Vienna; Russia, Austria and Prussia. Mercantilism, capitalism and the rise of the middle class. Origins and consequences of the Enlightenment.

HIST 334 History of Europe in the Nineteenth Century
Credits 3.3 Lecture Hours.
Cultural, economic, and political processes that shaped European civilization (east and west); the Napoleon era; industrialization and urbanization; liberalism and socialism; empire and revolution; cultural developments.

Prerequisite: Junior or senior classification.

HIST 335 Europe, 1890-1932
Credits 3.3 Lecture Hours.
A political, diplomatic, social and cultural history of Europe prior to, during and shortly after World War I.

HIST 336 Europe Since 1932
Credits 3.3 Lecture Hours.
A political, diplomatic, military, social and cultural history of Europe prior to, during and since World War II.

HIST 337 War and European Society in the Twentieth Century
Credits 3.3 Lecture Hours.
War and social change in Europe during the twentieth century; relationships between front lines and home fronts; government and civil society; gender and war; ethnic and national identities in Eastern, Central, and Western Europe.

Prerequisite: Junior or senior classification.

HIST 338 The Rise of the European Middle Class
Credits 3.3 Lecture Hours.
Survey of European society and social classes from the origins of capitalism in the Middle Ages to the triumph of the “middle class world” in the 19th century; rise of the middle class, development of bourgeois ideology and culture, and creation of the working class.
HIST 339 Eastern Europe Since 1453
Credits 3. 3 Lecture Hours.
Eastern Europe from the fall of the Byzantine Empire to the present; the
Ottoman, Habsburg, Russian and Soviet Empires; the origins of modern
East European states.
Prerequisite: Junior or senior classification.

HIST 341 Latin America to 1810
Credits 3. 3 Lecture Hours.
Political history of South America from exploration and settlement to
independence; colonial institutions; commercial systems.
Prerequisite: Junior or senior classification.

HIST 342 Latin America Since 1810
Credits 3. 3 Lecture Hours.
Political history of independent South American nations since
independence with emphasis upon ABC countries; economic, social and
cultural development; foreign relations.
Prerequisite: Junior or senior classification.

HIST 343 Inter-American Relations
Credits 3. 3 Lecture Hours.
Cultural, diplomatic and economic relations in the Western Hemisphere in
historical perspective.
Prerequisite: Junior or senior classification or approval of instructor.

HIST 344/AFST 344 History of Africa to 1800
Credits 3. 3 Lecture Hours.
Origins of humankind in Africa; development and spread of pastoralism,
agriculture and iron-working; formation of states and empires; impact of
Christianity and Islam; rise of international trade in gold, ivory and slaves;
African diaspora.
Prerequisite: Junior or senior classification.
Cross Listing: AFST 344/HIST 344.

HIST 345/AFST 345 Modern Africa
Credits 3. 3 Lecture Hours.
Survey of Africa since 1800; pre-colonial African states and societies;
establishment and impact of European colonial rule; rise of nationalist
movements; achievement of independence; problems of political stability
and economic development in contemporary Africa; South Africa's
apartheid regime and its opponents.
Prerequisite: Junior or senior classification.
Cross Listing: AFST 345/HIST 345.

HIST 346/AFST 346 History of South Africa
Credits 3. 3 Lecture Hours.
Selected themes in the history of South Africa from the African Iron Age
to the Apartheid regime; history of race relations in the 19th and 20th
centuries and the rise of a modern industrial state.
Cross Listing: AFST 346/HIST 346.

HIST 347/RELS 347 Rise of Islam, 600-1258
Credits 3. 3 Lecture Hours.
Introduction to Islamic civilization from the rise of Islam to the Mongol
conquests; examination of pre-Islamic poetry, the Qur'an, early Islamic
laws on prayer, the ethical conventions of jihad, the lives of Muslim
women, and the relation of Islam to Judaism and Christianity.
Prerequisite: Junior or senior classification.
Cross Listing: RELS 347/HIST 347.

HIST 348 Modern Middle East
Credits 3. 3 Lecture Hours.
Survey of the Middle East since 1800; introduction to Islam and Islamic
civilization; decline of the Ottoman Empire; European imperialism; rise of
nationalist movements; Zionism and the emergence of Israel; Arab-Israeli
conflict; impact of oil; revolution in Iran and Islamic resurgence.
Prerequisite: Junior or senior classification.

HIST 349/ASIA 349 The Vietnam War/The American War
Credits 3. 3 Lecture Hours.
Vietnam's relations with the West; French colonialism; origins and
development of Vietnamese nationalism; Cold War and American
involvement; wartime societies in North and South Vietnam; expansion of
the war to Cambodia and Laos; anti-war movements in the United States;
reasons for American defeat; consequences and lessons of the war.
Prerequisite: Junior or senior classification.
Cross Listing: ASIA 349/HIST 349.

HIST 350/ASIA 350 Asia During World War II
Credits 3. 3 Lecture Hours.
The origins and development of Japanese imperialism; Japan's expansion
into East and Southeast Asia; wartime societies; collaboration and
resistance; effects of the war in the United States upon Japanese-
Americans; the outcomes of the war; remembrance of the war.
Prerequisite: Junior or senior classification.
Cross Listing: ASIA 350/HIST 350.

HIST 351/ASIA 351 Traditional East Asia
Credits 3. 3 Lecture Hours.
History and culture of China and Japan from earliest times to the coming
of the West; impact of Confucianism and Buddhism; development of
social, political and economic systems.
Cross Listing: ASIA 351/HIST 351.

HIST 352/ASIA 352 Modern East Asia
Credits 3. 3 Lecture Hours.
Impact of the West on traditional China and Japan; the response through
modernization; rise of nationalism and formation of modern nation states.
Prerequisite: Junior or senior classification.
Cross Listing: ASIA 352/HIST 352.

HIST 353 Modern South Asia
Credits 3. 3 Lecture Hours.
Survey of the modern nation states of South Asia, including India,
Pakistan, Bangladesh, Afghanistan, Nepal, Ceylon, Bhutan, and Burma,
ca., 1600 to the present; major political events; economic, social, and
cultural developments.
Prerequisite: Junior or senior classification.

HIST 354/ASIA 354 Imperial China
Credits 3. 3 Lecture Hours.
History of imperial China from the earliest dynasties through the mid-19th
century, including major political events, the structure of Chinese
government, economic development, philosophies and religion, wars and
military and culture and daily life.
Prerequisite: Junior or senior classification.
Cross Listing: ASIA 354/HIST 354.

HIST 355/ASIA 355 Modern China
Credits 3. 3 Lecture Hours.
History of China from the coming of the West to the present; social,
economic and political changes which have taken place during that period.
Cross Listing: ASIA 355/HIST 355.
HIST 356/ASIA 356 Twentieth Century Japan
Credits 3. 3 Lecture Hours.
Industrialization and modernization of Japan; its rise from an isolated nation to a major world power and economic giant.
Cross Listing: ASIA 356/HIST 356.

HIST 357/AFST 357 Out of Africa: The Black Diaspora and the Modern World
Credits 3. 3 Lecture Hours.
History and cultures of the peoples of the African Diaspora from the fourteenth through the nineteenth centuries; social, political, and economic impact on Africa, the Americas, Europe, and the Arab World; emphasis on race, gender, identity, and migration.
Prerequisite: Junior or senior classification.
Cross Listing: AFST 357/HIST 357.

HIST 358/ASIA 358 Chinese Cultural History
Credits 3. 3 Lecture Hours. 0 Lab Hours.
Examination of Chinese culture and its evolution over the last 4,000 years; customs, art, literature, festivals, folklore, religion, architecture, medicine, and everyday life.
Prerequisite: Junior or senior classification.
Cross Listing: ASIA 358/HIST 358.

HIST 359 American Environmental History
Credits 3. 3 Lecture Hours.
History of American attitudes toward nature: use of land, water, timber, oil, coal, wildlife and other natural resources in the United States; conservation movement and significant conflicts over resources; changing perception of the physical environment.

HIST 360 History of Energy in America
Credits 3. 3 Lecture Hours.
Impact of energy upon industrial America; emphasis on relationship between energy and industrial development, emergence of state and federal energy policies, role of energy in foreign policy, growth of energy-oriented industries and impact of energy development on the environment.

HIST 361 Technology and Engineering in Western Civilization, 1400-Present
Credits 3. 3 Lecture Hours.
Man's material culture and his understanding of the physical world since the 15th century; role of the Renaissance and the Scientific, Agricultural and Industrial Revolutions in Europe; the resulting transformations in western civilization.

HIST 362 History of Science
Credits 3. 3 Lecture Hours.
The ideas of the great scientists and their impact on society; the Newtonian Revolution; Lavoisier and the new chemistry; Darwin and evolutionary thought; Enrico Fermi, Robert Oppenheimer and the development of nuclear energy.

HIST 363 History of Science in America
Credits 3. 3 Lecture Hours.
The major developments in the physical and life sciences from colonial times to the present; the lives and scientific contributions of such famous American scientists as Benjamin Franklin, Joseph Henry, Thomas Edison and J. Robert Oppenheimer.

HIST 364 History of Technology and Engineering in America, 1607-Present
Credits 3. 3 Lecture Hours.
American technological development from the colonial times to the present; technology in society, factors affecting technological development, changing attitudes toward technological accomplishments and the effects of technology upon society.

HIST 365/RELS 365 History of Religion in America to 1860
Credits 3. 3 Lecture Hours.
Religion in America from European origins through New England Puritanism. U. S. Constitutional issues, immigration, revivalism and the Civil War; relationship between dissenters, utopians and visionaries versus mainstream counterparts.
Cross Listing: RELS 365/HIST 365.

HIST 366/RELS 366 History of Religion in America from 1860 to the Present
Credits 3. 3 Lecture Hours.
Religion in America from the Civil War; relationship of religion and science, ethnic assimilation, emergence of fundamentalism, mass evangelism, cults and criticisms of contemporary culture; examination of social and racial problems by the major religious traditions.
Cross Listing: RELS 366/HIST 366.

HIST 367 Colonization of North America
Credits 3. 3 Lecture Hours.
Geographic setting; early English, French, Dutch, Swedish discovery, conquest and settlement, 1497-1763; colonial administration; colonial life; inter-colonial wars.

HIST 368 The Birth of the Republic, 1763-1820
Credits 3. 3 Lecture Hours.
Impact of French and Indian War; British colonial policy 1763-1775; War for Independence; Confederation crisis; Constitution-making and ratification; development of political parties; problem of foreign entanglements; War of 1812; conflict of nationalist and sectionalist tendencies; historiography and interpretation.

HIST 369 The United States, 1820-1860
Credits 3. 3 Lecture Hours.
Jacksonian democracy; impact of nationalism and sectionalism; manifest destiny and Mexican War; slavery controversy; expansion.

HIST 370 Civil War and Reconstruction
Credits 3. 3 Lecture Hours.
Survey of background and causes of the war; military, political, economic, and diplomatic aspects of the war; life behind the lines; Reconstruction and post-war adjustments, 1861-1877.

HIST 371 America in the Gilded Age, 1877-1901
Credits 3. 3 Lecture Hours.
The United States from 1877 to 1901; political, cultural and economic developments.

HIST 372 Reform, War and Normalcy: The United States, 1901-1929
Credits 3. 3 Lecture Hours.
Emergence of Progressivism; reform in the cities and states; reforms and foreign policies of the Theodore Roosevelt, William Howard Taft and Woodrow Wilson administrations; World War I and aftermath; Harding-Coolidge normalcy; the Jazz Age; Hoover and the Great Crash.

HIST 373 The Great Depression and World War II
Credits 3. 3 Lecture Hours.
The United States, 1929-1945; cultural, social, economic, and political developments in the nation; global diplomacy and military strategy.
HIST 374 The United States After World War II
Credits 3.3 Lecture Hours.
The United States since World War II; political, economic, cultural and social changes and role as a world leader.

HIST 376 Great Scientists in History
Credits 3.3 Lecture Hours.
History of fundamental scientific principles through biography; Galileo, Newton, Darwin, Mendel, Curie, Einstein, Pauling, and others.
Prerequisite: Junior or senior classification.

HIST 401 Slavery in World History
Credits 3.3 Lecture Hours.
Comparative history of human slavery; slavery in the Ancient World, Asia, Africa; varieties of political, social, cultural, and economic life in divided and occupied Germany; abolition of slavery and continuing forms of human bondage in the contemporary world.
Prerequisite: Junior or senior classification.
Cross Listing: AFST 401 and ASIA 401.

HIST 402 Germany Since 1815
Credits 3.3 Lecture Hours.
A survey of the unification of Germany; creation of the German Empire; Weimar Republic; rise and fall of Nazi Germany; and the role of Germany in international diplomacy.

HIST 403 History of Nazi Germany
Credits 3.3 Lecture Hours.
Inner workings of the Third Reich from inception in 1933 to collapse at the end of World War II in 1945; leadership and structure of the Nazi party; family life, religion and business.

HIST 404 Post 1945 Germanies
Credits 3.3 Lecture Hours.
Examines Germany from the end of World War II to the end of the 20th century; includes political, social, cultural, and economic life in divided and occupied Germany; covers Germany since reunification in 1990.
Prerequisite: Junior or senior classification.

HIST 405 History of the Holocaust
Credits 3.3 Lecture Hours.
History of the Nazi Holocaust; Third Reich; Jewish Ghetto life and concentration camps; role of the military, S.S. and German business; lessons and legacies.

HIST 406 The Era of the French Revolution and Napoleon, 1715-1815
Credits 3.3 Lecture Hours.
Origins and events of the French Revolution; Napoleon Bonaparte and the First Empire; social, economic, political and military developments in France and Europe.

HIST 407 History of France Since 1815
Credits 3.3 Lecture Hours.
Nineteenth century Bourbon, Orleanist, Bonapartist and Republican regimes; France in World Wars I and II; De Gaulle and the role of France in the 20th century.

HIST 410 Russian History to 1801
Credits 3.3 Lecture Hours.
Origins and Christianization of Russia; establishment and decline of Kievan Rus’ state; Mongol conquest and domination of Russia; rise of Moscow, establishment of tsardom, expansion of state in sixteenth and seventeenth centuries; Peter the Great’s reforms; emergence of Russian Empire as a major power; era of Catherine the Great.

HIST 411 Imperial Russia 1801-1917
Credits 3.3 Lecture Hours.
The last century of the autocratic Romanov dynasty and the social, intellectual, economic and political forces that ended it; political culture, society in transition, international affairs and revolutionary groups in an era of reform, counter-reform, reaction and industrialization.

HIST 412 Soviet Union 1917-1991
Credits 3.3 Lecture Hours.
Political and social evaluation of the Soviet system; the Russian Revolution and consolidation of Bolshevik power; Civil War; power struggles among Lenin’s successors; Stalin’s industrial revolution, collectivization, and terror; Khrushchev’s de-Stalinization campaign, stagnation under Brezhnev; Gorbachev’s attempts at radical reform; the collapse of the Soviet Union.

HIST 416 Texas Since 1845
Credits 3.3 Lecture Hours.
History of Texas since annexation; social, cultural, economic and political developments and the place of Texas in national affairs.

HIST 418 European Intellectual History from Ancient Greece to the Early Middle Ages
Credits 3.3 Lecture Hours.
Political and social history of selected major figures and important movements in political theory, literature, sociology, art, economics and philosophy from Pre-Socratic Greece through the formative stages of the Christian Middle Ages.
Prerequisite: Junior or senior classification.
Cross Listing: CLAS 418 and RELS 418.

HIST 419/RELS 419 European Intellectual History from the High Middle Ages to the 17th Century
Credits 3.3 Lecture Hours.
Political and social history of selected major figures and important movements in political theory, literature, sociology, art, economics and philosophy from the founding of Scholasticism and the University System to the New Philosophy and science of 17th century.
Prerequisite: Junior or senior classification.
Cross Listing: RELS 419/HIST 419.

HIST 420 European Intellectual History from the Enlightenment to 1900
Credits 3.3 Lecture Hours.
(3-0). Political and social history of selected major figures and important movements in political theory, literature, sociology, art, economics and philosophy in the 18th and 19th centuries.

HIST 421 European Intellectual History in the Twentieth Century
Credits 3.3 Lecture Hours.
Political and social history of selected major figures and important movements in political theory, literature, sociology, art, economics and philosophy from the turn of the century to the present.

HIST 426/CLAS 426 The Ancient Greeks
Credits 3.3 Lecture Hours.
Greek History and civilization from the Archaic Age to Alexander the Great (8th-late 4th century B.C.).
Prerequisite: Junior or senior classification, or approval of instructor.
Cross Listing: CLAS 426/HIST 426.
HIST 427/CLAS 427 The Roman Republic I: The Empire Builders
Credits 3.3 Lecture Hours.
Roman history and civilization from the beginnings of the Republic (6th/5th century B.C.) to the late 2nd century B.C.
Prerequisite: Junior or senior classification, or approval of instructor.
Cross Listing: CLAS 427/HIST 427.

HIST 428/CLAS 428 The Roman Republic II: The Civil Wars
Credits 3.3 Lecture Hours.
Roman history and civilization from the late 2nd century B.C. to the 1st century A.D.
Prerequisite: Junior or senior classification, or approval of instructor.
Cross Listing: CLAS 428/HIST 428.

HIST 429/CLAS 429 The Roman Empire
Credits 3.3 Lecture Hours.
Roman History and civilization of the Imperial Period (1st century B.C.-6th century A.D.).
Prerequisite: Junior or senior classification.

HIST 431 The Kingdom of Ireland, 1541-1800
Credits 3.3 Lecture Hours.
History of Ireland from the mid sixteenth century through the end of the eighteenth century; impact of religion, politics, warfare, land disputes, famine, and international developments; creation of the United Kingdom.
Prerequisite: Junior or senior classification.

HIST 432 The Nation of Ireland, 1800 to the Present
Credits 3.3 Lecture Hours.
History of Ireland from the creation of the United Kingdom through the end of the twentieth century; British-Irish relations; agrarian unrest and violence; famine; political, cultural, and religious developments.
Prerequisite: Junior or senior classification.

HIST 435 Sixteenth-Century Britain
Credits 3.3 Lecture Hours.
Changes in social, cultural, economic, political and religious institutions and organization; growth of the nation state; the "new monarchy": Reformation and religious settlement; international relations; inflation and social dislocation; the role of Parliament.

HIST 436 Seventeenth-Century Britain
Credits 3.3 Lecture Hours.
Social, political, economic, cultural and religious developments, Puritanism and the Revolution of the 1640s, the Restoration, establishment of constitutional monarchy after 1688, Great Britain's rise as an imperial power.

HIST 437 Eighteenth Century Britain
Credits 3.3 Lecture Hours.
Political, social, economical, intellectual, cultural, and imperial history of Britain in the eighteenth century.
Prerequisite: Junior or senior classification.

HIST 438 Nineteenth Century England
Credits 3.3 Lecture Hours.
Political, social, economic and intellectual history of England from 1815 to 1914.

HIST 439 Twentieth Century England
Credits 3.3 Lecture Hours.
Constitutional, political, economic, military and social history of England since 1910.

HIST 440 Latin American Cultural and Intellectual History
Credits 3.3 Lecture Hours.
Main currents of culture and thought as shaped by historical circumstances.

HIST 441 History of Mexico, 1821 to the Present
Credits 3.3 Lecture Hours.
Political, economic and social development of Mexico since independence and her relation to other world powers.

HIST 442 World War II
Credits 3.3 Lecture Hours.
Origins; military campaigns in Europe, North Africa, Asia, and the Pacific; European, Japanese, Asian, and American home fronts; collapse of Germany; atomic warfare; legacies.
Prerequisite: Junior or senior classification.

HIST 443 American Military History to 1901
Credits 3.3 Lecture Hours.
American military experience from colonial days to 1901; causes, nature and effect of the wars in which the United States has participated.

HIST 444 American Military History Since 1901
Credits 3.3 Lecture Hours.
American military experience from 1901 to present; causes, nature and effect of wars in which the United States has participated; effect of war on American history.

HIST 445 History of Modern Military Thought
Credits 3.3 Lecture Hours.
Military thought and theory, 1700 to the present.

HIST 447 Law and Society in the United States
Credits 3.3 Lecture Hours.
How political and social conditions in American history have produced fundamental constitutional principles, changes and practices; historical evolution of written and unwritten Constitution.

HIST 449 History of Brazil, 1822 to the Present
Credits 3.3 Lecture Hours.
Political, cultural and economic development of Brazil since independence; slavery and race relations; relation to other world powers.
Prerequisite: Junior classification.

HIST 450 The Old South
Credits 3.3 Lecture Hours.
History of antebellum South; physical bases of Southern regionalism; Southern alignments on national issues; slavery-plantation economy and society of Old South; secession and formation of Confederacy.

HIST 451 The New South
Credits 3.3 Lecture Hours.
Political, economic, social and intellectual developments in the South since Reconstruction.

HIST 453 The American Frontier
Credits 3.3 Lecture Hours.
Westward movement; patterns of westward expansion, pioneer settlement, the West in diplomacy and influence of frontier on American life and institutions.

HIST 455 History of the American City
Credits 3.3 Lecture Hours.
History of American Cities: a social, economic and political study of industry, labor and immigration; development of a metropolitan society.
HIST 456 American Agricultural History
Credits 3.3 Lecture Hours.
History of American agricultural development from the Revolutionary period to the present; technological developments, major farm industries, labor, regional development, farm movements and farm programs.

HIST 459 American Society and Culture to 1877
Credits 3.3 Lecture Hours.
Century of social and political thought, religion, science, scholarship and education in the United States.

HIST 460 American Society and Culture Since 1877
Credits 3.3 Lecture Hours.
Continuation of HIST 459 from 1877 to the present.

HIST 461/WGST 461 History of American Women
Credits 3.3 Lecture Hours.
Cultural, political, legal and religious factors that helped shape the role and character of women in American society from colonial times to the present; historical role of women in the development of the nation.
Cross Listing: WGST 461/HIST 461.

HIST 462 American Foreign Relations
Credits 3.3 Lecture Hours.
History of U.S. foreign relations and policies to 1913.

HIST 463 American Foreign Relations
Credits 3.3 Lecture Hours.
History of U.S. foreign relations and policies since 1913.

HIST 464 International Developments Since 1918
Credits 3.3 Lecture Hours.
General survey of world politics since close of World War I; problems and ideologies of great powers of Europe and factors and conditions which explain present political tendencies and policies.

HIST 469 History of Collective Protest and Violence
Credits 3.3 Lecture Hours.
Examination of collective protest and violence on a case study basis and in comparative and historical context; emphasis on causes, the nature of participation, assumptions and goals, and the character of repression.
Prerequisite: Junior or senior classification.

HIST 470 American Business History
Credits 3.3 Lecture Hours.
Management strategy and structure of the modern corporation in 19th and 20th century America and the corporation's changing roles in American society.

HIST 473/WGST 473 History of Modern American Women
Credits 3.3 Lecture Hours.
Emergence of modern American women in the 1890s; examination of their history from the 1890s to the present; women as organizers, innovators, political reformers, workers, social activists, housewives, mothers, consumers and feminists.
Cross Listing: WGST 473/HIST 473.

HIST 475 Empire and History
Credits 3.3 Lecture Hours.
Survey of empire in a wide historical and comparative framework using a case study approach; themes of a given case study include changing social, economic, and cultural politics of imperialism, resistance in colonial environments, colonial and post-colonial identities, and race and gender relations. May be taken 3 times for credit.
Prerequisite: Junior or senior classification.

HIST 476/WGST 476 Sex and Sexuality in History
Credits 3.3 Lecture Hours.
Changing ideas about sex and sexuality over time; includes their interaction with ideas about gender, race, class, religion, science, technology, medicine, politics and popular culture; historical and cultural processes creating modern concerns about sex and sexuality.
Prerequisite: Junior or senior classification.
Cross Listing: WGST 476/HIST 476.

HIST 477/WGST 477 Women in Modern European History
Credits 3.3 Lecture Hours.
Women in Europe from the 18th century to the present: women's contributions to their societies; realities of their daily lives and their responses; perceptions of women; role of institutions in defining women's roles; significance for women of industrialization, revolution, warfare, scientific discoveries; interaction of class, race and gender.
Cross Listing: WGST 477/HIST 477.

HIST 481 Seminar in History
Credits 3.3 Lecture Hours.
Literature of an issue, event, period or people in history; use of primary source materials connected with the field of the seminar; problems of bibliography, historiography and historical method; and experience in writing.
Prerequisite: 21 credits of history, 9 of which must be 300-level or above. Open to senior history majors or with instructor's approval.

HIST 485 Directed Studies
Credits 3.0 to 3.0 to 3.0 Other Hours.
Selected fields of history not covered in depth by other courses. Reports and extensive reading required.
Prerequisite: Approval of department head.

HIST 489 Special Topics in...
Credits 1 to 4.1 to 4 Lecture Hours.
Selected topics in an identified area of history.

HIST 491 Research
Credits 0 to 3.0 to 3.0 Other Hours.
Research conducted under the direction of faculty member in history.
Prerequisites: 24 hours if history, with 12 or more at 300-level or above; junior or senior classification and approval of instructor.

HIST 497 Independent Honors Studies
Credits 1 to 3.1 to 3 Other Hours.
Directed independent studies for upper division Honors students, regardless of academic major, in selected aspects of history.
Prerequisites: Junior or senior classification either as Honors student or with overall GPR of 3.25 and letter of approval from head of student's major department and approval of head, Department of History.

HIST 601 Colonial North America
Credits 3.3 Lecture Hours.
The 17th- and 18th-century settlement of European North American colonies; slavery; comparisons of colonial administrations; interactions of Native Americans, Europeans, and African Americans across racial, ethnic, and cultural borders. May be taken two times for credit as content varies.
Prerequisite: Graduate classification.
HIST 604 The Early Republic
Credits 3. 3 Lecture Hours.
War for Independence; organizing the new government; the Constitutions; Federalists and Jeffersonians; Wars of 1812 and 1846; race, class, and gender in Jacksonian society; political, social, cultural, economic and territorial changes. May be taken two times for credit as content varies.
Prerequisite: Graduate classification.

HIST 613 Twentieth Century United States Diplomacy
Credits 3. 3 Lecture Hours.
U.S. foreign policies from end of Spanish-American War to present; scope, principles, practices, objectives, dangers and lessons learned.
Prerequisite: Approval of department head.

HIST 615 Colonial America
Credits 3. 3 Lecture Hours.
Social, ethnic, political, economic, religious, military, and cultural institutions in colonial Latin America, including attention to ethnohistory, women, and comparative colonial systems.
Prerequisite: Graduate classification.

HIST 617 Latin America: The National Period
Credits 3. 3 Lecture Hours.
Social, ethnic, cultural, religious, political, and economic history of Latin America.
Prerequisite: Graduate classification.

HIST 620 Sectionalism, Civil War and Reconstruction
Credits 3. 3 Lecture Hours.
Antebellum sectional divisions; causes of the Civil War; military campaigns and political and military leadership; the changing status of African Americans; social, political, economic, cultural and diplomatic developments; Reconstruction.
Prerequisite: Graduate classification.

HIST 621 The Emergence of Modern America
Credits 3. 3 Lecture Hours.
Social, political, economic and cultural developments in the late 19th and early 20th centuries; industrialization; labor and farmer unrest; immigration; frontier transitions, imperialism.
Prerequisite: Graduate classification.

HIST 623 America since World War II
Credits 3. 3 Lecture Hours.
The Cold War; wars in Korea, Vietnam, and the Persian Gulf; the Civil Rights and Women's Rights Movements; immigration; social, cultural, and gender controversies.
Prerequisite: Graduate classification.

HIST 624 Readings in Race, Ethnicity, and Migration
Credits 3. 3 Lecture Hours.
Selected topics and themes in the history of race, ethnicity, and migration; individual and community identity-formation; colonization, slavery, and empire; migration and immigration; social movements; borders and nation-building. May be taken three times for credit as content varies.
Prerequisite: Graduate classification.

HIST 625 Research Seminar in Race, Ethnicity, and Migration
Credits 3. 3 Lecture Hours.
Topics and issues in the study of race, ethnicity, and migration history. May be taken three times for credit as content varies.
Prerequisite: Graduate classification.

HIST 628 Historiography
Credits 3. 3 Lecture Hours.
Analysis of historical writing and philosophy of history; works of important historians from Herodotus to present; schools, theories and function of history.
Prerequisite: Approval of department head.

HIST 629 Research Methods and Professional Development
Credits 3. 3 Lecture Hours.
Prepares for a career in history by exploring the practical side of the profession; includes life as a graduate student, teaching, research methods, ethics, grant-writing, conference papers, publishing, non-academic alternatives, and the job market.
Prerequisite: Approval of instructor.

HIST 630 Quantitative Methods in Historical Research
Credits 3. 3 Lecture Hours.
Introduction to formal methods of analysis in historical research using computers; and applying quantitative methods to research problems.
Prerequisite: Approval of instructor.

HIST 631 Reading Seminar in United States History to 1877
Credits 3. 3 Other Hours.
Prerequisite: Approval of department head.

HIST 632 Reading Seminar in United States History after 1876
Credits 3. 3 Lecture Hours.
Prerequisite: Approval of department head.

HIST 633 The American West
Credits 3. 3 Lecture Hours.
Immigrants and settlement patterns; international conflicts; social, racial, ethnic and cultural interactions across frontiers and borders; economic developments; politics and admission of new states into the United States; women's and gender issues; environmental concerns. May be taken two times as content varies.
Prerequisite: Graduate classification.

HIST 634 Maritime History and Sea Power
Credits 3. 3 Lecture Hours.
Examines the maritime and naval history of the world with emphasis on the Western World since 1600; trade and communication, exploration, technology, maritime communities and naval warfare.
Prerequisite: Graduate classification.

HIST 635 Writing History
Credits 3. 3 Lecture Hours.
Development of writing skills for graduate students in history; preparation of publishable-quality article-length essays based on primary sources; peer review and criticism.
Prerequisites: Graduate classification; approval of instructor.

HIST 639 Readings in Asian History
Credits 3. 3 Lecture Hours.
Social and cultural transformation of modern Asia; politics and government; wars and military; imperialism and foreign relations; economic development, society, and culture. May be taken three times for credit as content varies.
Prerequisite: Graduate classification.
HIST 640 Readings in Atlantic World and Caribbean History  
Credits 3. 3 Lecture Hours.  
Selected topics and themes in the history of the Atlantic World and Caribbean; revolutions, European colonialism in Africa and the Americas; transatlantic slave trade; growth of plantation societies; abolition of slavery; post-emancipation period. May be taken three times for credit as content varies.  
Prerequisite: Graduate classification.  

HIST 641 Research Seminar in Atlantic World and Caribbean History  
Credits 3. 3 Lecture Hours.  
Topics and issues in the history of the Atlantic World and the Caribbean. May be taken three times for credit as content varies.  
Prerequisite: Graduate classification.  

HIST 643 Reading Seminar in European History from Renaissance to French Revolution  
Credits 3. 3 Lecture Hours.  
Reading seminar in European history from the Renaissance to the French Revolution, classic and current themes, debates and methodologies in European history from the Renaissance to the French Revolution.  
Prerequisite: Approval of department head.  

HIST 644 Reading Seminar in European History from French Revolution to Present  
Credits 3. 3 Lecture Hours.  
Reading seminar in European history from the French Revolution to the present; classic and current themes, debates and methodologies in European history from the French Revolution to the present.  
Prerequisite: Approval of department head.  

HIST 645 Research Seminar in War and Society  
Credits 3. 3 Lecture Hours.  
Research and writing seminar focusing on issues and topics in war and society. May be taken four times for credit as content varies.  

HIST 646 Readings in War and Society  
Credits 3. 3 Lecture Hours.  
Reading seminar focusing on methodological issues related to the study of war and society; impact of organized violence and warfare on social structures; military organizations and operations; the experience of non-combatants. May be taken four times for credit as content varies.  
Prerequisite: Approval of instructor and director of graduate studies; graduate classification.  

HIST 648 Readings on Topics in Modern European History  
Credits 3. 3 Lecture Hours.  
Readings on topics covering the history of the political, social, cultural, intellectual, and diplomatic development of modern Europe as a whole or in part, or that of individual nations, empires, or regions. May be taken three times for credit as content varies.  
Prerequisite: Graduate classification.  

HIST 666 History of Technology  
Credits 3. 3 Lecture Hours.  
Origins of the subfield; historiography; industrial development and labor relations; impact on the military; gender, class, and other social aspects.  
Prerequisite: Graduate classification.  

HIST 674 Readings in Chicano-Latino History  
Credits 3. 3 Lecture Hours.  
Selected topics and themes related to Chicano-Latino history; race/ethnicity, gender/sexuality, labor adaption and resistance movements; colonialism, transnationalism, immigration; identity, and citizenship. May be taken three times for credit as content varies.  
Prerequisite: Graduate classification.  

HIST 675 Research Seminar in Chicano-Latino History  
Credits 3. 3 Lecture Hours.  
Seminar focuses on researching and writing, core skills for historians; conduct primary source research in a subfield Chicano-Latino history and compose an article-length paper. May be taken three times for credit.  
Prerequisite: Graduate classification.  

HIST 677 Modern Britain  
Credits 3. 3 Lecture Hours.  
Political, social, cultural, economic and diplomatic development of the United Kingdom in the 20th Century. May be taken for credit two times as content varies.  
Prerequisite: Graduate classification.  

HIST 678 Readings in the Southwest and its Borders  
Credits 3. 3 Lecture Hours.  
Reading seminar focusing on how groups in the American Southwest articulate, enforce and challenge difference; brings together disparate historiographies to consider a variety of theoretical and methodological approaches used in understanding borders; examines contact, conflict and change across various kinds of historical and cultural boundaries. May be taken two times for credit as content varies.  
Prerequisite: Graduate classification.  

HIST 679 Research Seminar in the Southwest and its Borders  
Credits 3. 3 Lecture Hours.  
Research and writing seminar focusing on selected topics and themes in an identified area of Southwest Border Studies. May be taken two times for credit as content varies.  
Prerequisite(s): Graduate classification.  

HIST 685 Directed Studies  
Credits 1 to 6. 1 to 6 Other Hours.  
Individual problems of research or scholarly activity not pertaining to thesis or dissertation, or selected instruction not covered by other courses.  
Prerequisite: Approval of instructor and department head.  

HIST 689 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of American or European history. May be repeated for credit.  

HIST 691 Research  
Credits 1 to 23. 1 to 23 Other Hours.  
Thesis research.  
Prerequisite: Approval of department head.  

HLTH - Health  

Courses  

HLTH 210 Introduction to the Discipline  
Credits 3. 3 Lecture Hours.  
Concepts essential to understanding the discipline: competencies and career opportunities for professional health educators in school and community settings.  
Prerequisites: Current health major; HLTH 231 or concurrent enrollment.  

HLTH 214/KINE 214 Health and Physical Activity for Children  
Credits 3. 3 Lecture Hours.  
Coordinated school health and physical activity programs appropriate for elementary aged children; focus on the content of the curriculum and the philosophical underpinnings of programming related to health and physical activity.  
Prerequisite: KINE 198.  
Cross Listing: KINE 214/HLTH 214.
HLTH 216 First Aid
Credits 2. 1 Lecture Hour. 2 Lab Hours.
(PHED 1206, 1306) First Aid. Basic first aid instruction leading to National Safety Council, University Level, first aid course completion recognition.

HLTH 221 Safety
Credits 3. 3 Lecture Hours.
The magnitude of the accident problem as it relates to individual and community well-being; promotion of safe behavior. No credit will be given for both HLTH 221 and SAED 301.

HLTH 222 Concepts in Peer Health Education
Credits 3. 3 Lecture Hours.
Preparation as peer educators and campus community leaders; experiential learning; includes various health topics, program development, presentation and public speaking, communication and group facilitation.

HLTH 231 Healthy Lifestyles
Credits 3. 3 Lecture Hours.
(PHED 1304) Healthy Lifestyles. Health issues relevant to students; included are mental health, use and abuse of drugs, human sexuality, communicable diseases, environmental and consumer health.

HLTH 236 Race, Ethnicity and Health
Credits 3. 3 Lecture Hours.
Explore in-depth the racial, ethnic, and cultural dimensions that underlie health and health disparities; emphasis on culture, social economic status and governmental policies as they influence the adaptation of health practices.

HLTH 240/KINE 240 Computer Technology in Health and Kinesiology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Application of current technology in the areas of health and kinesiology; fundamentals of computers and their use; application of commercial software to health and kinesiology settings; use of computer networks for communications and research.
Prerequisite: Freshman or sophomore classification in health or kinesiology.
Cross Listing: KINE 240/HLTH 240.

HLTH 285 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Work on a specified topic with the intent of promoting independent reading, research and study; supplement existing course offerings or subjects not presently covered.
Prerequisites: Freshman or sophomore classification; approval of instructor.

HLTH 291 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in health. May be repeated 4 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

HLTH 311 Community Health
Credits 3. 3 Lecture Hours.
Aspects of the community that relate to health; identification and analysis of community health programs; organizational pattern and functions of voluntary and governmental health agencies; organizing the community for health action; and coordination of school and community health programs.
Prerequisite: HLTH 231 or concurrent enrollment.

HLTH 322 School Health Program
Credits 3. 3 Lecture Hours.
Background, development, administration and framework of the school health program; role of the school health team; nature and function of school health services and healthful school living.
Prerequisite: HLTH 231 or concurrent enrollment.

HLTH 334/WGST 334 Women's Health
Credits 3. 3 Lecture Hours.
A broad range of health issues that are either unique to women or of special importance to women; information for the health consumer; preparation as an advocate of healthy lifestyles; awareness of the role health plays in the life of all women.
Prerequisite: Junior or senior classification.
Cross Listing: WGST 334/HLTH 334.

HLTH 335 Human Diseases
Credits 3. 3 Lecture Hours.
Causes of disease, course of communicable disease, body's defense against disease and classification and description of diseases.
Prerequisite: BIOL 319, BIOL 320; admission to professional phase of program.

HLTH 342 Human Sexuality
Credits 3. 3 Lecture Hours.
Many aspects of human sexuality; physiology and function of human reproductive system, factors involved in learning sex roles, biological and emotional motivations associated with the sexual aspects of life and their relationship to marriage and family planning.
Prerequisite: Admission to the professional phase of program.

HLTH 353 Drugs and Society
Credits 3. 3 Lecture Hours.
Use and abuse of drugs in today's society; physiological, sociological and psychological factors involved.
Prerequisite: BIOL 319, BIOL 320; admission to professional phase of program.

HLTH 354 Medical Terminology for the Health Professions
Credits 3. 3 Lecture Hours.
Designed for students interested in pursuing a career in a health, medical, scientific or other helping profession; develop medical word power skills combined with related health and disease knowledge.
Prerequisite: Junior or senior classification.

HLTH 403 Consumer Health
Credits 3. 3 Lecture Hours.
Selection, evaluation and understanding of health information, medical services, advertising of products and sociocultural factors in consumer health protection.
Prerequisite: Junior or senior classification.

HLTH 405 Rural Health
Credits 3. 3 Lecture Hours.
Issues facing rural health care; emphasis on understanding the geographical characteristics of rural communities and their affect on health care delivery.
Prerequisites: HLTH 331; junior or senior classification.
HLTH 407 Global Health  
**Credits 3.3 Lecture Hours.**  
Overview of global health issues; synthesis of historical, cultural, environmental, economic and political perspectives; gathering and understanding international health statistics; cultural, social and political impacts on health and health care behaviors; clinical and population-based approaches to health management and illness resolution; ethical issues implicit in conducting health research; private and public agency relief strategies; opportunities for employment in international health.  
**Prerequisites:** Admission to the professional phase of program; junior or senior classification or approval of instructor.

HLTH 410 Exercise and Health Programs in the Workplace  
**Credits 3.3 Lecture Hours.**  
Careful examination of strategies to design, implement and evaluate exercise and health programs in worksites; including health risk assessment, marketing protocol, needs assessment, corporate culture issues, policy development and cost-benefit analysis.  
**Prerequisite:** Junior or senior classification.

HLTH 415 Health Education Methodology  
**Credits 3.3 Lecture Hours.**  
Theory and practice in the development and use of creative and traditional health education strategies in secondary schools and community settings; emphasis is given to cognitive, affective and behavioral teaching strategies.  
**Prerequisites:** Senior classification and approved acceptance to field experience.

HLTH 421 Elementary School Health Instruction  
**Credits 3.3 Lecture Hours.**  
Modern issues, trends, content and material in elementary school health programs; research and instructional strategies essential for reading in content areas with an emphasis on developing the coordinated school health education for health and kinesiology teacher certification majors.  
**Prerequisite:** Junior or senior classification in health or kinesiology; admission to professional phase of program.

HLTH 425 Health Program Evaluation  
**Credits 3.3 Lecture Hours.**  
Theory and practice in evaluation of health programs in school and community; analysis of test results; evaluation of standardized health tests.  
**Prerequisites:** Senior classification and approved acceptance to field experience.

HLTH 429 Environmental Health  
**Credits 3.3 Lecture Hours.**  
Health aspects of environments; health problems related to water, air and noise pollution; pesticides; population and radiation; examination of various micro-environments which either promote or hinder human health and well-being and their implications for community planning and utilization of human resources.  
**Prerequisite:** Junior or senior classification.

HLTH 440 Contemporary Issues for Community Health Interns  
**Credits 3.3 Lecture Hours.**  
Preparatory course for advanced students in the community health internship program.  
**Prerequisite:** Acceptance to internship program.

HLTH 445 Professional Practice in Health Education  
**Credits 2.2 Lecture Hours.**  
Information, perspectives and skills to promote health and quality of life effectively in community, school, workplace and health-care settings; boundary-crossing partnerships across health disciplines; the role of collaborative efforts to better meet community health needs.  
**Prerequisites:** Admission to professional phase of program; junior or senior classification.

HLTH 481 Seminar in Allied Health  
**Credit 1.1 Lecture Hour. 1 Lab Hour.**  
Admission to allied health professional school and/or careers; research on selected allied health fields; discussion of transition from college environment to professional school/career environment including professional development. Must be taken on a satisfactory/unsatisfactory basis.  
**Prerequisites:** Junior or senior classification.

HLTH 482 Grant Writing in Health  
**Credit 1.1 Lecture Hour.**  
A writing intensive course focused on grant writing in the field of health education and health promotion; grant application written by student on a health-related topic using a recursive writing process. May be taken two times for credit. Must be taken on a satisfactory/unsatisfactory basis.  
**Prerequisite:** Admission to professional phase of program.

HLTH 484 Community Health Internship  
**Credits 0 to 12.0 to 12 Other Hours.**  
Supervised internship at selected community, public or private health agencies.  
**Prerequisites:** HLTH 415, HLTH 425 and HLTH 440; completion of all coursework.

HLTH 485 Directed Studies  
**Credits 0 to 4.0 to 4 Other Hours.**  
Directed study of special problems within the discipline.  
**Prerequisites:** Junior or senior classification; approval of instructor.

HLTH 489 Special Topics in...  
**Credits 0 to 4.0 to 4 Lecture Hours.**  
Selected topics in an identified area of the discipline. May be repeated for credit.

HLTH 491 Research  
**Credits 0 to 4.0 to 4 Other Hours.**  
Research conducted under the direction of faculty member in health. May be repeated 4 times for credit.  
**Prerequisites:** Junior or senior classification and approval of instructor.

HLTH 605 Health Research Methods  
**Credits 3.3 Lecture Hours.**  
Designing and conducting health education and health promotion research including survey design, sampling, data collection, management and analysis.  
**Prerequisite:** Graduate classification.

HLTH 607 International Health  
**Credits 3.3 Lecture Hours.**  
Health and health care delivery around the world; how various organizations are addressing global health concerns; includes emerging diseases, eradication of disease, global nutrition, family planning; emphasis on providing health information on a cross cultural environment.  
**Prerequisite:** Graduate classification.
HLTH 609 Applied Epidemiology
Credits 3. 3 Lecture Hours.
Principles and methods of epidemiology; epidemiologic investigation and research are discussed with emphasis on application of epidemiological methods to health promotion and disease prevention.
Prerequisite: Graduate classification.

HLTH 610 Health Assessment
Credits 3. 3 Lecture Hours.
Concepts and procedures of health assessment; interpretation of health appraisal instruments; function of health assessment in health education, health promotion and wellness programs.
Prerequisite: HLTH 425 or course in statistics.

HLTH 611 Organization and Administration of Health
Credits 3. 3 Lecture Hours.
Organizing and management of public health education and health promotion programs; public health administration issues and management skills emphasized.
Prerequisite: Graduate classification.

HLTH 622 Issues and Trends in Health Education
Credits 3. 3 Lecture Hours.
Background and development of health education as an applied science; current issues and trends in health education and their implications for health education.

HLTH 629 Environmental Health
Credits 3. 3 Lecture Hours.
Examination of environments that threaten health and implications for human health and community health planning; emphasis on planning and implementing health education and promotion strategies to promote a healthy environment.
Prerequisite: Graduate classification.

HLTH 630 Health Program Planning
Credits 3. 3 Lecture Hours.
Public health education and promotion program planning including educational diagnosis, selection of educational strategies, program implementation and evaluation; using planning models.
Prerequisite: Graduate classification.

HLTH 631 Community and Public Health
Credits 3. 3 Lecture Hours.
Community health problems; public health laws; national, state and local health agencies.

HLTH 632 Health Program Evaluation
Credits 3. 3 Lecture Hours.
Evaluation of public health education and promotion programs; overview of theory of program evaluation, methodology and application.
Prerequisite: Graduate classification.

HLTH 634 Women’s Health
Credits 3. 3 Lecture Hours.
Women’s Health. Health and health care concerns of women; emphasis on importance of women’s health issues to public health; identification of special concerns for planning and implementation of women’s health programs.
Prerequisite: Graduate classification.

HLTH 635 Race, Ethnicity and Health
Credits 3. 3 Lecture Hours.
Explore racial, ethnic, and cultural dimensions that underlie health and health disparities; special attention to culture, social economic status, and governmental policies as they influence the adaptations of health practices.
Prerequisite: Graduate classification.

HLTH 639 Behavioral Foundations of Health Education
Credits 3. 3 Lecture Hours.
Theoretical and historical foundations of health behavior research: emphasis placed on understanding and predicting behavior, as well as facilitating behavior change programs through health education.

HLTH 640 Health Intervention and Wellness
Credits 3. 3 Lecture Hours.
Wellness as a concept and a process; systematic planning, implementation and evaluation of wellness programs and review of research relating to the efficacy of wellness programs and methods.
Prerequisite: HLTH 415 or equivalent.

HLTH 641 Foundations in Health Education
Credits 3. 3 Lecture Hours.
Introduction to the profession of Health Education; basic history, philosophy, theory, and standards; responsibilities and competencies of the health educator; methods of practice.
Prerequisites: Graduate classification; admission to E-Master's program in Health Education.

HLTH 642 Health Education Ethics
Credit 1. 1 Lecture Hour.
Basic concepts in health education ethics; ethical dilemmas faced by health educators; articulated ethics framework; includes fairness, justice, and the reduction of unjust disparities in the health education practice.
Prerequisites: Graduate classification; admission to E-Master's program in Health Education.

HLTH 643 Introduction to Epidemiology
Credits 2. 2 Lecture Hours.
Principles and methods of epidemiology; epidemiologic investigations and research; emphasis on application of epidemiological methods for health promotion and disease prevention.
Prerequisites: Graduate classification; admission to E-Master's program in Health Education.

HLTH 644 Health Education Theory
Credits 3. 3 Lecture Hours.
Theory in the practice of Health Education; selected theories and their structure, function, and value to health professionals.
Prerequisites: Graduate classification; admission to E-Master’s program in Health Education.

HLTH 645 Health Education Research and Program Evaluation
Credits 3. 3 Lecture Hours.
Design and conduct health education and health promotion research and evaluation; provide an overview of program evaluation and research theory, methodology, and application.
Prerequisite: Graduate classification; admission to E-Master's program in Health Education.
HLTH 646 Health Education Training
Credits 3. 3 Lecture Hours.
Designing, implementing, and evaluating workforce training for professional health educators; emphasis on evidence-based workforce training.
Prerequisites: Graduate classification; admission to E-Master's program in Health Education.

HLTH 649 Advanced Health Behavior Theory
Credits 3. 3 Lecture Hours.
Examine the nature of theoretical thinking and its application to health research design, analysis, and program development; explore new theoretical trends in health education sciences research and education; exposed to an informed critique of current health behavior theories and their uses.
Prerequisite: HLTH 639 or approval of instructor.

HLTH 659 Writing for Health Educators
Credits 3. 3 Lecture Hours.
Practical application activities to enhance writing appropriate for entry level PhD trained professionals in their field; taught in a seminar format.
Prerequisite: Graduate classification.

HLTH 660 Health Issues in Aging, Dying and Death
Credits 3. 3 Lecture Hours.
Health issues related to aging, dying and death including: health problems of aging individuals; community response to health problems of aging individuals; issues regarding definitions of death; bereavement, grief and mourning and educational implications of aging, dying and death.
Prerequisite: Approval of instructor.

HLTH 669 Professional Skills Development for Health Educators
Credits 3. 3 Lecture Hours.
Provides the tools necessary to become an effective health education professional; issues will be discussed that will be critical to the success of a future university faculty member.
Prerequisite: Graduate classification.

HLTH 671 Interdisciplinary Seminar in Prevention Science
Credit 1. 1 Lecture Hour.
Contemporary research programs that represent interdisciplinary field of prevention science; strengths and limitations of diverse theoretical and conceptual bases of research in prevention science, application of research findings to issues related to the prevention of mental, emotional, and physical health problems and the promotion of well-being. May be taken 3 times for credit.
Prerequisite: Graduate classification and enrollment in the interdisciplinary graduate certificate in prevention science or approval of instructor.
Cross Listing: COMM 671, RPTS 620 and SPSY 620.

HLTH 681 Seminar
Credit 1. 1 Lecture Hour.
Reports and discussions of topics of current interest in the discipline.

HLTH 684 Professional Internship
Credits 1 to 6. 1 to 6 Other Hours.
Designed to permit students the opportunity for on-the-job training with professionals in schools and public and institutional health agencies.
Prerequisites: 12 semester hours of selected graduate work; approval of department head.

HLTH 685 Directed Studies
Credits 1 to 12. 1 to 12 Other Hours.
Directed study of selected problems within the discipline. May be repeated for credit.
Prerequisite: Approval of department head.

HLTH 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of the discipline. May be repeated for credit.
Prerequisite: Approval of department head.

HLTH 690/KINE 690 Theory of Research in the Discipline
Credits 3. 3 Lecture Hours.
Theory and design of research problems and experiments in various subfields of the discipline; communication of research proposals and results; evaluation of current research of faculty and students and review of current literature. May be repeated for credit.
Cross Listing: KINE 690/HLTH 690.

HLTH 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research for thesis or dissertation.
Prerequisite: Approval of committee chair.

Horticulture - Horticultural Sciences

Courses

HORT 101 Concepts of Horticultural Science
Credit 1. 1 Lecture Hour.
Introduction to the many facets of horticulture in Texas and the United States including organization, history and nature of the industry; discussion of professional development and identification of career opportunities.

HORT 201 Horticultural Science and Practices
Credits 3. 3 Lecture Hours.
(AGRI 1315, 1415, HORT 1301, 1401) Horticultural Science and Practices. Structure, growth and development of horticultural plants from a practical and scientific approach; environmental effects, basic principles of propagation, greenhouse and outdoor production, nutrition, pruning and chemical control of growth, pest control and branches of horticulture.

HORT 202 Horticultural Science and Practices Laboratory
Credit 1. 3 Lab Hours.
Methods and practices related to production of horticultural crops; practical exercises in greenhouse and field.
Prerequisite: HORT 201 or registration therein.

HORT 203 Floral Design
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Principles of design illustrated with the use of floral materials; floral design elements and techniques including color, form, line and texture; history and utilization of floral art in society.

HORT 225 Horticulture Learning Community
Credit 1. 1 Lecture Hour.
Understanding the personal and professional competencies that should develop during college career; determine learning style; develop oral and written communication skills, teamwork and leadership characteristics, analytical and critical thinking, research and problem solving skills; exposure to current critical issues in horticulture and science.
Prerequisite: Horticulture or floriculture major.*
HORT 281 Horticulture as a Profession.
Credit 1. 1 Lecture Hour.
Comprehensive view of the opportunities in the art and science of horticulture; sub-disciplines by crop (fruit, vegetable, ornamental, floral) and approach (landscaping, production, sales, management, floral design, research); examination of the national and international scope of horticulture including the major horticultural regions in Texas; construction of a professional e-portfolio.

HORT 291 Research
Credits 1 to 3. 1 to 3 Other Hours.
Research conducted under the direction of faculty member in horticulture. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

HORT 301 Garden Science
Credits 3. 3 Lecture Hours.
Identification, propagation, soil management, fertilization, growth control and protection of common garden plants: indoor ornamentals, landscape ornamentals, fruits and vegetables; special topics include home landscaping, container gardens, bonsai, herbs and medicinal plants and hobby greenhouse management. The effects of organic and non-organic practices on the garden ecosystem.

HORT 302 Garden Science Lab
Credit 1. 3 Lab Hours.
Practical activities in identification, propagation, fertilization, media preparation, soil management, irrigation and protection of indoor ornamentals, landscape ornamentals, fruits and vegetables common in gardens in Texas. Organic and non-organic methods.

HORT 306 Woody Ornamental Plants
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Better known woody ornamental trees and shrubs; identification, morphology, classification, nomenclature and adaptability for use in landscape environments.
Prerequisite: BIOL 101 or HORT 201 or approval of instructor.

HORT 308 Landscape Plant Materials
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Identification and use of indigenous and introduced landscape plants; plants for special uses in urban environments; emphasis on plants’ ornamental attributes, cultural requirements, and adaptability in urban and suburban environments.
Prerequisite: HORT 201 or HORT 306 or BIOL 101 or approval of instructor.

HORT 309 Interior Plants
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Identification, selection and maintenance of interior foliage plants; emphasis on design solutions for commercial and private facilities.
Prerequisites: HORT 201; junior or senior classification.

HORT 311/FSTC 311 Principles of Food Processing
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Principles and practices of canning, freezing, dehydration, pickling and specialty food manufacture; fundamental concepts of various techniques of preparation, processing, packaging and use of additives; processing plants visited.
Prerequisites: FSTC 201; junior or senior classification or approval of department head or instructor.
Cross Listing: FSTC 311/HORT 311.

HORT 315 Issues in Horticulture
Credits 3. 3 Lecture Hours.
Analysis of contemporary economic, technological, environmental, human resource, and regulatory issues that impact the way global horticultural firms compete; emphasis on problem recognition and analysis of managerial decisions by firms throughout the entire horticultural supply chain.
Prerequisites: HORT 201 and HORT 202.

HORT 319 Fruit and Nut Production
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Rootstocks, cultivars, identification, site selection, pollination, pruning, fruit thinning, dormancy, orchard culture management, irrigation, pest control, harvesting and post harvest physiology of temperate fruit and nut species.
Prerequisite: HORT 201.

HORT 325 Vegetable Crop Production
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Origin, nutritive value, economic importance, botany and cultural practices of the major vegetable crops. Lab activities include organic and non-organic production of major vegetable crops.

HORT 326 Plant Propagation
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Principles, practices and techniques followed in the sexual and asexual propagation of horticultural plants: seed technology and seed propagation, rooting and propagation of cuttings, graftage and budding systems, layering and propagation by specialized plant structures, biotechnology and tissue culture systems for micropropagation.

HORT 332 Horticulture Landscape Graphics
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Graphic representation of landscape design; demonstrations of technique; examination of drawing examples and drawing production; basic hand graphics techniques for visual-thinking and presentation-quality landscape drawings.
Prerequisite: Junior or senior classification.

HORT 335 Sociohorticulture
Credits 3. 3 Lecture Hours.
Horticulture as it relates to humans through people-plant interactions; use of horticulture to improve quality of life; awareness and appreciation of the economic, environmental, social and health benefits of plants.
Prerequisite: Junior classification.

HORT 400 Field Studies in Horticulture
Credits 1 to 3. 1 to 9 Other Hours.
Field trip to observe operation of horticultural businesses, governmental agencies affecting horticultural programs, and public and private institutions active in horticulture in the U.S. and other countries; usually arranged during spring break, between semesters or during the summer; may be repeated for credit.
Prerequisites: HORT 201 or HORT 301 and approval of instructor.

HORT 404/GENE 404 Plant Breeding
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Application of genetics and other sciences to breeding and improvement of horticultural crops; methods and special techniques employed. Offered in even numbered years.
Prerequisite: GENE 301.
Cross Listing: GENE 404.
HORT 418 Nut Culture
Credits 3. 3 Lecture Hours.
Orchard management, native grove development, cultivars, fruit setting, soils, nutrition, propagation, pest control, harvesting, shelling, storage and marketing of temperate tree nut crops grown in the U.S. with major emphasis on pecans. Offered in odd numbered years.
Prerequisite: HORT 319 or approval of instructor.*

HORT 419 Viticulture and Small Fruit Culture
Credits 3. 3 Lecture Hours.
Classic winegrape culture in Europe and U.S. are taught; influence of climate, soil, cultivar, rootstock, canopy and management is presented; nutrition, water, spacing, trellis, pruning, IPM and harvest are integrated for quality yields; culture of muscadines, berries, figs and persimmons are taught. Offered in even numbered years.
Prerequisite: HORT 319 or approval of instructor.

HORT 420 Concepts of Wine Production
Credits 3. 3 Lecture Hours.
Classic wine grapes of the world and where they are produced; evaluation of wine style and quality through formal laboratory tastings.
Prerequisites: HORT 201, HORT 319, HORT 419 or HORT 446/FSTC 446 or FSTC 201; must be 21 years of age; junior or senior classification.

HORT 421 Enology
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Provides a basic understanding of each step of the wine making process; emphasis on home and small scale commercial wine production as related to Texas conditions.
Prerequisites: Must be 21 years of age; junior or senior classification.*

HORT 423 Tropical Horticulture
Credits 3. 3 Lecture Hours.
Production, processing and marketing of coffee, bananas, cacao, mango, cashew, pineapple, coconut and root and tuber crops; recent significant developments in plant breeding and cultural practices. Offered in odd numbered years.
Prerequisites: HORT 201 or approval of instructor.

HORT 425 Landscape Maintenance and Construction
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Principles and practices of grading, drainage and construction of residential and small commercial landscapes; cost and bid estimation; soil preparation; transplanting operations; control of landscape diseases and pests; maintenance of landscape areas.
Prerequisite: HORT 201 or approval of instructor.

HORT 426 International Floriculture Marketing
Credits 3. 2 Lecture Hours.
Importance, cost, and opportunities in marketing floral products, fresh cut flowers, flowering potted plants, foliage plants, and bedding/garden plants; topics include: world production areas, economic value, species grown, marketing channels, retail environments, current/future consumers, postharvest handling, promotion/advertising, perceived/added value, marketing trends and employment opportunities.
Prerequisites: HORT 201; junior or senior classification.

HORT 427 Fall Greenhouse Crops
Credit 1. 2 Lab Hours.
Hands-on lab for growing and managing fall greenhouse crops including fall bedding plants, cut flowers, foliage, poinsettias and other flowering potted plants.

HORT 428 Greenhouse Operation and Management
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Principles of greenhouse operation and management for production of horticultural crops; construction and operation of greenhouse structures and systems; regulating and controlling the environment and applying cultural practices as they affect plant physiological processes and influence plant growth and development; management of a greenhouse business.
Prerequisite: HORT 201.*

HORT 429 Floriculture Crop Production
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Production of floriculture crops in the greenhouse environment; scheduling and controlling crop growth for target market periods; specific flowering crops will be used as models to demonstrate potted flowering plant, cut flower, and garden plant production systems; hands-on crop production experience in lab.
Prerequisite: HORT 201.*

HORT 431 Nursery Production and Management
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Container, field and protected culture production of ornamental nursery plants (shrubs, trees, ground covers, bedding plants and herbaceous perennials); retail and wholesale nursery-site selection and development, financing, niche-marketing, personnel and labor management; wholesale nursery production cycles and systems, storage and shipping.*

HORT 432 Horticulture Landscape Design
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Application of the principles and elements of design to planning and developing both exterior residential landscape designs and interior commercial designs.
Prerequisites: HORT 203; HORT 332; HORT 306 or HORT 308 or approval of instructor.

HORT 435 Urban Horticulture
Credits 3. 3 Lecture Hours.
Introduction to urban horticulture and its role in community development and well-being; emphasis on career opportunities and the roles of the urban horticulture programmer. Offered in odd numbered years.
Prerequisite: Junior or senior classification.

HORT 440 International Horticulture
Credits 3. 3 Lecture Hours.
Examines the source of horticultural commodities; shows how geography, culture, politics, and history influence our markets, gardens and refrigerators; educates students on interpreting different garden styles; offered in even number years.
Prerequisite: Junior or senior classification.

HORT 442 Horticulture Landscape Design II
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Introduce computer-aided-drafting (CAD) to produce site layout, grading and planting plan, and construction details for small-scale landscape design; advanced design principles and practices in their historical context, includes design and drafting of hardscape details, manipulation of earth forms, ecological urban park design to traditional garden design.
Prerequisites: HORT 203, HORT 308 and HORT 432 or approval of instructor; junior or senior classification.
HORT 446/FSTC 446 Commercial Fruit and Vegetable Processing  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Pilot plant and laboratory operations pertaining to processed fruits, vegetables and beverages; new product development emphasized via individual laboratory projects. Offered in even numbered years.  
Prerequisite: FSTC 311/HORT 311.  
Cross Listing: FSTC 446/HORT 446.  

HORT 451 Retail Floristry  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Principles of floral design in a commercial shop enterprise; aspects of design in vase arrangements, personal flowers, sympathy flowers and flowers for special occasions; production costs and profit analysis, selling techniques and customer relations; term project required.  
Prerequisite: HORT 203 or approval of instructor.  

HORT 452 Floral Design: Weddings and Personal Flowers  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Basic principles of floral design as applied to wedding work; design principles and mechanics as applied to corsages, headdresses, hand bouquets and ceremony and reception decorations; history of wedding traditions; selling and pricing weddings.  
Prerequisite: HORT 203 or HORT 451 or approval of instructor.  

HORT 453 Floral Art  
Credits 2. 1 Lecture Hour. 2 Lab Hours.  
Advanced study of floral design as an art form in contrast to a commercial florist operation; interpretive expression of design principles and color stressed along with international design styles.  
Prerequisites: HORT 203, HORT 451 and/or HORT 452.  

HORT 454 Special Event Design and Production  
Credits 2. 1 Lecture Hour. 2 Lab Hours.  
The role of event planners, production managers, designers, and decorators within traditional event management practices; analyze how artistic components are used in visual styling to achieve a specific purpose; impact of collaborative planning, effective research, and strong communication skills, social psychological and economic influences as they relate to event planning.  
Prerequisite: Junior or senior classification.  

HORT 481 Seminar  
Credits 2. 2 Lecture Hours.  
Advanced preparation for the transition from college to the work environment including career investigation, presentation techniques and practice, resume and e-portfolio preparation, and professional development and career advancement; required of all senior students in horticulture.  
Prerequisite: Junior or senior classification.  

HORT 484 Internship  
Credits 1 to 9. 1 to 9 Other Hours.  
On-the-job experience program in the student's area of horticultural specialization. May be taken three times for credit.  
Prerequisites: Sophomore, junior or senior classification; approval of instructor; 2.0 GPR in major and overall.  

HORT 485 Directed Studies  
Credits 1 to 4. 1 to 4 Other Hours.  
Special problems and projects in any area of horticulture.  
Prerequisite: Junior or senior classification or approval of department head.  

HORT 489 Special Topics in...  
Credits 1 to 4. 0 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified area of horticultural science. May be repeated for credit.  
Prerequisite: Approval of instructor.*  

HORT 491 Research  
Credits 1 to 3. 1 to 3 Other Hours.  
Research conducted under the direction of faculty member in horticulture. May be repeated 2 times for credit. Registration in multiple sections of this course are possible within a given semester provided that the per semester credit hour limit is not exceeded.  
Prerequisites: Junior or senior classification and approval of instructor.  
NOTE: Undergraduate floriculture courses are taught under the horticulture designation.  

HORT 604 Applied Physiology of Horticultural Crops  
Credits 3. 3 Lecture Hours.  
Chemical, biological and environmental factors in growth and differentiation and their application to ornamental, fruit and vegetable crops; growth kinetics; sink-source relations; fruit development; seed development and germination; juvenility; apical dominance; growth retardants; pruning; photoperiodism; flowering; sex expression; and senescence.  
Prerequisites: MEPS 313 or approval of instructor.  

HORT 605 Internet Applications for Horticulture  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Internet applications for horticulture presents the theory and practice of computer networks and networking so that the information and educational content (not the hardware) is the key; the focus is on the World Wide Web and creating Web materials for teaching, research and extension applications.  
Prerequisite: Graduate classification.  

HORT 608 Plants for Landscape Design  
Credits 4. 3 Lecture Hours. 2 Lab Hours.  
Identification and use of indigenous and introduced plants in landscape designs; plants for special uses in commercial and residential developments; emphasis on ornamental attributes, identification, cultural requirements, limitations and adaptability in urban and suburban environments for important taxa; discussion of current issues, research, and trends in selection, marketing, and utilization of plants for landscape design.  
Prerequisite: HORT 201 or HORT 308 or BIOL 101, or approval of instructor, not open to students with previous credit for HORT 306.*  

HORT 609 Plants for Landscape Design II  
Credits 4. 3 Lecture Hours. 2 Lab Hours.  
Identification and use of indigenous and introduced landscape plants; plants for special uses in urban environments; emphasis on plants' ornamental attributes, cultural requirements, and adaptability in urban and suburban environments. Not open to students who have completed HORT 308.  
Prerequisites: BOTN 101, HORT 201, HORT 306, HORT 608, or approval of instructor.
HORT 610/MEPS 610 Physiological and Molecular Basis for Plant Stress Response
Credits 3. 3 Lecture Hours.
Provide the tools to understand the molecular and physiological consequences caused by environmental factors (abiotic and biotic) on plant growth and development and the mechanisms of stress adaptation to stress.
Prerequisite: MEPS 313 or equivalent.
Cross Listing: MEPS 610/HORT 610.

HORT 611 Ecology of Urban Landscape
Credits 3. 3 Lecture Hours.
Basic concepts and current topics in ecology or urban landscapes; role of plants in urban and fragmented ecosystems ranging from individual plant responses to changes in ecosystem function; discuss recent literature in the field of urban plant ecology.
Prerequisite: An undergraduate or graduate class in plant biology or plant ecology is recommended.

HORT 618/MEPS 618 Root Biology
Credits 3. 3 Lecture Hours.
Basic concepts and current topics in root-soil ecology; managed and natural ecosystems including grasslands, cropping systems and forests; role of roots in the rhizosphere, the effects of soil, nutrient and water stress and climate change in C and N cycling and carbon sequestration; participate in discussions and critique recent literature.
Prerequisite: Approval of instructor.
Cross Listing: MEPS 618/HORT 618.

HORT 619 Plant-Associated Microorganisms
Credits 3. 3 Lecture Hours.
Basic concepts and current topics in plant-microbe interactions including the diversity of plant-associated microorganisms; the plant as a microbial environment; endophytes; microbial roles in plant nutrition and fitness; uses of microorganisms for improved plant health and sustainable agriculture; microbial roles in food safety and future challenges; discussion of current literature.
Prerequisites: Basic plant biology or plant ecology is recommended; microbiology is helpful, but not required. Cross listed with PLPA 619 and MEPS 619.

HORT 626 International Floriculture Marketing
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Importance, cost and opportunities in marketing floral products, fresh cut flowers, flowering potted plants, foliage plants, and bedding/garden plants; topics include world production areas, economic value, species grown, marketing channels, retail environments, current/future consumers, postharvest handling, promotion/advertising, perceived/added value, marketing trends and employment opportunities.
Prerequisite: Graduate classification.

HORT 630 Post-Harvest Biology, Physiology and Genetics of Plants
Credits 3. 3 Lecture Hours.
Overview of biological, physiological and genetic mechanisms which impart phenotypes associated with quality and value of plant products; current emphasis in areas of ripening, senescence, fruit and flower development, and relevant applications of biotechnology will be focus of course.
Prerequisite: Approval of instructor.

HORT 640 Phytochemicals in Fruits and Vegetables to Improve Human Health
Credits 3. 3 Lecture Hours.
Current scientific knowledge about the role of phytochemicals in their diet; increase the knowledge and awareness of successful, cost effective, public and private integrated approaches to reduce the health and economic burden of chronic diseases; provide instructional curricular resources media for dissemination through conventional and distance education technology.
Prerequisite: Approval of instructor.

HORT 641 Science of Foods for Health
Credits 3. 3 Lecture Hours.
Recent scientific advances on knowledge of foods for health using evidence based research justification; includes interdisciplinary topics emphasizing horticultural science, nutrition and biochemistry.
Prerequisite: Approval of instructor.

HORT 645/SCSC 645 World Agriculture and International Plant Breeding
Credit 1. 1 Lecture Hour.
Evolution of world agriculture; plant breeding and improved varieties; international agricultural research centers and green revolution; population growth; environmental challenges; IPR; role of plant breeding and biotechnology in meeting world food needs.
Prerequisite: SCSC 304, HORT 404/GENE 404 or approval of instructor.
Cross Listing: SCSC 645/HORT 645.

HORT 681 Seminar
Credit 1. 1 Lecture Hour.
Student and staff participation in review of literature and reporting on current developments in research on production and processing of horticultural crops. Required of all graduate students in horticulture and floriculture. May be taken more than once but not exceed 3 hours of credit.
Prerequisite: Graduate classification.

HORT 684 Professional Internship
Credits 1 to 4. 1 to 4 Other Hours.
Program planned to provide professional training in student's particular field of interest. Faculty and employer will supervise the activity. Work-study planned as a part of the Master of Agriculture degree program in fruit, ornamentals or vegetable production, processing and handling or landscape or garden design and maintenance.
Prerequisite: Approval of instructor.

HORT 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Individual problems of research or scholarly activity not pertaining to thesis or dissertation, or selected instruction not covered by other courses. Final documentation of directed study is required.
Prerequisite: Approval of instructor.

HORT 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 1 to 4 Lab Hours.
Selected topics in an identified area of horticulture. May be repeated for credit.
Prerequisite: Approval of department head.

HORT 690 Theory of Research
Credit 1. 1 Lecture Hour.
Design of research experiments in various fields of horticulture and floriculture and evaluation of results with the aid of examples taken from the current scientific literature. May be repeated for credit.
HORT 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research in horticultural problems for thesis or dissertation.

HORT 693 Professional Study
Credits 1 to 9. 1 to 9 Other Hours.
Approved professional paper undertaken as the requirement for the Master of Agriculture. May be taken more than once, but not to exceed 3 hours of credit towards a degree.
Prerequisite: Graduate classification.

HUMA - Humanities

Courses

HUMA 211/RELS 211 Hebrew Scriptures
Credits 3. 3 Lecture Hours.
Philosophical concepts of the Hebrew Scriptures as they relate to the development of religious and ethical ideas.
Cross Listing: RELS 211/HUMA 211.

HUMA 213/RELS 213 New Testament
Credits 3. 3 Lecture Hours.
The origin and development of the religious and philosophical concepts of the New Testament.
Cross Listing: RELS 213/HUMA 213.

HUMA 303/RELS 303 Near Eastern Religions
Credits 3. 3 Lecture Hours.
Beliefs and practices of Judaism, Zoroastrianism, Christianity and Islam with particular attention to their philosophical presuppositions.
Cross Listing: RELS 303/HUMA 303.

HUMA 304/RELS 304 Indian and Oriental Religions
Credits 3. 3 Lecture Hours.
Beliefs and practices of Hinduism, Jainism, Sikhism, Buddhism, Confucianism, Taoism and Shinto with particular attention to their philosophical presuppositions.
Cross Listing: RELS 304/HUMA 304.

HUMA 321 Political Islam and Jihad
Credits 3. 3 Lecture Hours.
Interaction between Islamic movements and politics in various Middle Eastern countries; the meaning and evolution of jihad; the role of Islam as a tool for political and social mobilization.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: INTS 321 and RELS 321.

HUMA 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Directed Studies in humanities. May be repeated for credit.
Prerequisite: Approval of department head.

HUMA 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of humanities. May be repeated for credit.
Prerequisite: Approval of instructor.

IBUS - International Business

Courses

IBUS 285 Directed Studies
Credits 1 to 3. 1 to 3 Other Hours.
Directed study of selected problems in international business not covered in other courses. May be taken two times for credit.
Prerequisites: Freshman or sophomore classification in business.

IBUS 289 Special Topics in...
Credits 1 to 3. 1 to 3 Lecture Hours. 0 to 3 Lab Hours.
Selected topics in an identified area of international business. May be taken two times for credit.
Prerequisites: Freshman or sophomore classification in business.

IBUS 301 Business Study Abroad
Credits 1 to 18. 1 to 18 Lecture Hours.
For students in approved programs abroad. May be repeated for credit.
Prerequisites: Admission to upper division in Mays Business School and selected for program; approval of study abroad coordinator and academic dean.

IBUS 401/MKTG 401 Global Marketing
Credits 3. 3 Lecture Hours.
I Survey of the aspects involved in marketing products and services in the international market; tariffs, cultural restrictions, business environment and legal restrictions.
Prerequisite: MKTG 321.
Cross Listing: MKTG 401/IBUS 401.

IBUS 402/MKTG 402 International Marketing: Study Abroad
Credits 3. 3 Lecture Hours.
Introduces marketing students to the facets of designing and implementing a marketing strategy in an international setting; provides a traditional classroom experience along with personal exposure to a variety of European cultures; facilitates understanding of the international marketplace in which these students will function.
Prerequisites: Junior classification; MKTG 321 or MKTG 409.
Cross Listing: MKTG 402/IBUS 402.

IBUS 403/MKTG 403 International Market Entry Strategies
Credits 3. 3 Lecture Hours.
A research-based course in which students prepare an analysis of a country, or region outside the U.S., and use it in the preparation of a marketing plan for a good or service to be introduced and marketed in that country.
Prerequisites: MKTG 321; concurrent registration in IBUS 402/MKTG 402 or MKTG 102; junior or senior classification.
Cross Listing: MKTG 403/IBUS 403.

IBUS 445/ACCT 445 International Accounting
Credits 3. 3 Lecture Hours.
Introduction and examination of accounting issues unique to multinational enterprises and international business activity. Does not count towards the accounting requirement for the CPA exam.
Prerequisites: ACCT 315 or ACCT 327; FINC 341.

IBUS 446/FINC 445 International Finance
Credits 3. 3 Lecture Hours.
International business transactions, balance of payments and exchange rate systems, exchange rate risk and hedging techniques, sources of funding, relation to international financial institutions and capital instruments; foreign direct investment; international asset and liability management.
Prerequisites: FINC 351 and FINC 361.
Cross Listing: FINC 445/IBUS 446.
IBUS 450/MGMT 450 International Environment of Business
Credits 3. 3 Lecture Hours.
Broad survey of international business issues; analyzes the environment in which international businesses operate; introduces multinational enterprises, global competition, international organizations, treaties and international law, national trade policies and the determinants of competitiveness of firms in international markets.
Prerequisites: Admitted to upper division in Mays Business School.
Cross Listing: MGMT 450/IBUS 450.

IBUS 452/MGMT 452 International Management
Credits 3. 3 Lecture Hours.
An overview of international management to include international dimensions of organizational behavior, theory, strategy and human resource management; application of theoretical ideas to real-world situations through case analyses, presentations, projects and interactive class discussion.
Prerequisite: MGMT 450/IBUS 450 or IBUS 450/MGMT 450, or concurrent enrollment.
Cross Listing: MGMT 452/IBUS 452.

IBUS 453/MGMT 453 Emerging Economies: Brazil, Russia, India, China
Credits 3. 3 Lecture Hours.
Examination of present and future dynamics of the emerging economies of Brazil, Russia, India and China and their impact on the developing and developed worlds; importance of BRIC countries and their position in the world; history and development of these countries and the current business environment in each.
Prerequisite: MGMT 363.
Cross Listing: MGMT 453/IBUS 453.

IBUS 455 Asian Business Environment
Credits 3. 3 Lecture Hours.
The scope of business environments of Asia; geographical, demographic and cultural makeup; economic integration; human and cultural elements; financial and communication infrastructures; risk and market analysis; trade and investment patterns; Asian MNC’s.
Prerequisite: Admission to upper division in Mays Business School.

IBUS 456 European Integration and Business
Credits 3. 3 Lecture Hours.
History and institutional structure of the European Union; its regional cultures, values, economies and rifts; challenges faced by corporations and people in the region, including issues involving doing business with the European Union.
Prerequisite: Admission to upper division in Mays Business School.

IBUS 457/MGMT 457 Global Entrepreneurship
Credits 3. 3 Lecture Hours.
Practical issues associated with taking small- and medium-size business global; includes importing and exporting, developing global strategies, evaluating market opportunities, regional impact on economies and people.
Prerequisite: Admission to upper division in Mays Business School.
Cross Listing: MGMT 457/IBUS 457.

IBUS 458 International Negotiations
Credits 3. 3 Lecture Hours.
Skill building strategies and exercises in communication, listening and issue identification; how to negotiate globally; importance of knowing people and cultures; practice and theory of effective negotiation; awareness of diverse constructions of reality and communicating across different groups.
Prerequisite: Admission to upper division in Mays Business School.

IBUS 459 Latin American Markets
Credits 3. 3 Lecture Hours.
Comparing and contrasting the Latin American, Canadian and U.S. markets across different variables, including culture, economics, social and legal aspects.
Prerequisite: MKTG 321.

IBUS 460 Academy for Future International Leaders
Credits 3. 3 Lecture Hours.
A practical orientation to international business and cultural issues to prepare selected Texas A&M students for the international marketplace; joint effort among all colleges at Texas A&M; designed to complement any academic major by helping students gain a global perspective of their chosen field of study.
Prerequisite: Junior or senior classification and selection for the Academy for Future International Leaders.

IBUS 484 International Business Internship
Credits 1 to 4. 1 to 4 Other Hours.
International business internship with practicing professionals under the direction of a faculty member.
Prerequisites: Admission to upper division in Mays Business School; approval of department head.

IBUS 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Directed study on selected problems in the area of international business.
Prerequisites: Admission to upper division in Mays Business School and approval of instructor.

IBUS 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of international business. May be repeated for credit.
Prerequisites: Admission to upper division in Mays Business School and approval of instructor.

IBUS 645/FINC 645 International Finance
Credits 3. 3 Lecture Hours.
Problems confronted by financial managers of firms with international business operations; international money and capital markets; exchange rate risks and political risks. May be repeated for up to 3 hours credit.
Classification 6 students may not enroll in this course.
Prerequisite: FINC 612 or FINC 629 or FINC 635.
Cross Listing: FINC 645/IBUS 645.

IBUS 646/ACCT 646 International Accounting
Credits 3. 3 Lecture Hours.
Introduction and examination of accounting issues unique to multinational enterprises and international business activity. Classification 6 students may not enroll in this course.
Prerequisites: ACCT 328; FINC 341.
Cross Listing: ACCT 646/IBUS 646.

IBUS 667/MGMT 667 Multinational Enterprises
Credits 3. 3 Lecture Hours.
Graduate seminar in international business; multinational enterprises (MNEs) are studied from various perspectives including economics, management, entry and expansion strategies, contractual agreements, transfer pricing, impacts on home and host countries, MNE-state relations, regional integration, public policies towards MNEs.
Prerequisite: Graduate classification.
Cross Listing: MGMT 667/IBUS 667.
IBUS 677/MKTG 677 Multinational Marketing Management
Credits 3. 3 Lecture Hours.
Theoretical and empirical materials on multinational marketing; nature and justification of international trade, analysis of environments faced by multinational firms and formulation of multinational marketing strategy. Classification 6 students may not enroll in this course.
Prerequisite: MKTG 613 or 621 or equivalent.
Cross Listing: MKTG 677/IBUS 677.

IBUS 678/MGMT 678 International Management
Credits 3. 3 Lecture Hours.
Survey of the issues, problems, challenges, and opportunities facing organizations competing in a global economy; includes: the environment of international management, international strategies, forms of organization design used by multinational firms, managing human resources in an international context, and cultural and control issues facing the international manager.
Prerequisite: Graduate classification.
Cross Listing: MGMT 678/IBUS 678.

IBUS 679/MGMT 679 International Business Policy
Credits 3. 3 Lecture Hours.
Determinants of U.S. competitiveness in international markets; the international environment of business; introduction to multinational enterprises, global competition, international organizations, protection of intellectual property; international trade regulations; strategic trade theory.
Prerequisite: Graduate classification.
Cross Listing: MGMT 679/IBUS 679.

IBUS 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed study of selected international business problems using recent developments in business research methods. Classification 6 students may not enroll in this course.
Prerequisite: Graduate classification and approval of instructor.

IBUS 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of international business. May be repeated for credit. Classification 6 students may not enroll in this course.
Prerequisite: Approval of instructor.

IBUS 692 International Professional Study II
Credits 1 to 12. 1 to 12 Lecture Hours.
Approved professional studies abroad on international business issues and organizations. May be taken to meet requirements for the MBA or MS degrees in business. Course to be taken for a grade. May be taken 3 times for credit.
Prerequisite: Admission to approved program.

IBUS 693 International Professional Study
Credits 1 to 12. 1 to 12 Other Hours.
Approved professional studies abroad on international business issues and organizations. May be taken to meet requirements for the MBA or MS degrees in business. To be taken on a satisfactory/unsatisfactory basis.
Prerequisites: Admission to approved program; approval of program coordinator.

IDIS - Industrial Distribution

Courses

IDIS 240 Introduction to Industrial Distribution
Credits 3. 3 Lecture Hours.
Definition, history, types of industrial distribution; range of products; line of distribution; function of and services provided by distributors; distributor operational and financial analyses; measures of organizational effectiveness; employment and advancement opportunities in the field of industrial distribution.

IDIS 300 Industrial Electricity
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Industrial applications of electrical theory, codes, circuitry, wiring devices, motors and controllers, switch gear and solid state controls.
Prerequisite: Industrial distribution or engineering technology major, junior or senior classification, PHYS 208 or PHYS 219; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better.

IDIS 303 Mechanical Power Transmission
Credits 3. 3 Lecture Hours. 2 Lab Hours.
Overview of the engineering concepts of mechanical power and the components within a system to provide transmission of that power into useful work; experimental application of the related theory as it relates to the industrial distributor; "real world" knowledge learned for application in industry.
Prerequisite: Industrial distribution major, junior or senior classification; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better.

IDIS 330 Sales Engineering
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Sales and sales management techniques for analyzing distribution challenges and providing solutions through effective communication; establishing credibility, effective questioning techniques, developing solutions, presenting solutions, anticipating objections and gaining a commitment, plus techniques for building, developing and compensating an effective sales organization.
Prerequisites: IDIS 240; industrial distribution major, junior or senior classification; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better.

IDIS 340 Manufacturer Distributor Relations
Credits 3. 3 Lecture Hours.
Approaches and procedures for developing and maintaining effective manufacturer distributor relations: marketing channel design, channel roles, managing uncertainty, legal and ethical imperatives, conflict resolution, decision support and strategic marketing.
Prerequisites: IDIS 240; industrial distribution major, junior or senior classification; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better.

IDIS 343 Distribution Logistics
Credits 3. 3 Lecture Hours.
Study of concepts, issues and techniques used to plan, analyze and control the logistics network; examination of three key logistical decision-making areas: inventories, facilities and transportation; particular interest will be the study of techniques and technologies for managing and optimizing the logistical (supply) chain.
Prerequisites: STAT 201, STAT 211, or STAT 303; industrial distribution major, junior or senior classification; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better.
IDIS 344 Distributor Information and Control Systems
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Industrial distribution systems including hardware and software operations; inventory management, vendor evaluation; physical distribution systems; use of bar codes, radio frequency and other automated data entry techniques; purchasing operations.
Prerequisites: IDIS 343; industrial distribution major, junior or senior classification; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better.

IDIS 400 Industrial Automation
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Industrial applications of electronic devices; instrumentation; AC and DC drives; local area networks; cell and area controllers and advanced applications of programmable controllers.
Prerequisites: IDIS 300; industrial distribution major, junior or senior classification; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better.

IDIS 403 Fluid Power Transmission
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Overview of the engineering concepts of hydraulics and pneumatic power and its components within a system to provide transmission of that power into useful work; experimental application of the related theory as it relates to the industrial distributor; "real world" knowledge learned for application in industry.
Prerequisites: IDIS 303; PHYS 208 or PHYS 219; industrial distribution major, junior or senior classification; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better.

IDIS 420 Contemporary Topics in Electronics Distribution: Going Green
Credits 3. 3 Lecture Hours.
Study of concepts, issues, and techniques used to plan and analyze supply chain for new generation of green products; utilize interdisciplinary approach combining team projects, individual research, case study analysis, and interaction with industry executives; creation of marketing and distribution roadmaps for growth opportunities.
Prerequisites: IDIS 300; IDIS 343; industrial distribution major, junior or senior classification; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better.

IDIS 421 Healthcare Distribution Networks
Credits 3. 3 Lecture Hours.
Examination of the value chain in the health care supply chain; emphasis on distributors in terms of competitive strategy, market power, distinctive capabilities and strategic alliances.
Prerequisites: IDIS 343; industrial distribution major, junior or senior classification; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better.

IDIS 424 Purchasing Applications in Distribution
Credits 3. 3 Lecture Hours.
Applications of purchasing systems, specifically for the distribution industry; emphasis on supplier relations, strategic purchase planning, supplier evaluation, global purchasing techniques, cost analysis, life cycle costing, value analysis; case studies and procurement modeling for distributors.
Prerequisites: IDIS 340; IDIS 343; industrial distribution major, junior or senior classification; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better.

IDIS 434 The Quality Process in Distribution
Credits 3. 3 Lecture Hours.
Application of the "Deming" principles specifically for distributors, including customer needs analysis, research and data collection methodology, employee involvement techniques, team building, statistical methods and data analysis; solutions to quality problems for distributors, lean and six-sigma principles.
Prerequisites: IDIS 344; industrial distribution major, junior or senior classification; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better.

IDIS 444 Ethics and Leadership in Distribution
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Managing change in a dynamic environment in industrial distribution including key success factors involved in firm profitability, issues of a strategic nature; negotiation processes; ethical behavior in achieving economic and social performance.
Prerequisites: IDIS 330; industrial distribution major, junior or senior classification; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better.

IDIS 445 International Sales and Marketing
Credits 3. 3 Lecture Hours.
Principles, cultural aspects of selling in the Latin American market, business-to-business selling environment, and marketing products, services and solutions in Latin America; local/country market analysis, strategic marketing, sales planning, alliances and partnerships, and operational support.
Prerequisite: Junior or senior classification.

IDIS 454 New Directions in Distributor Competitiveness
Credits 3. 3 Lecture Hours.
Investigation of new research in distributor competitiveness; focus on defining distribution strategy in changing market places; exploration of the latest applied findings and how companies are successfully implementing initiatives; project management approach to demonstrate the development of competitive advantage and design strategies for implementation.
Prerequisites: Junior or senior classification; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better.

IDIS 455 Humanitarian Distribution Networks
Credits 3. 3 Lecture Hours.
Humanitarian logistics; essential knowledge to model distribution systems in humanitarian environments; supplemented by case studies and a project.
Prerequisites: IDIS 343; junior or senior classification; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better.

IDIS 464 Distributor Operations and Financial Management
Credits 3. 3 Lecture Hours.
Assessment of firm performance utilizing financial statement analysis and industry studies; methods for planning, implementing and monitoring profitability from distributor operations; procedures for controlling cash flow; credit, receivables, inventory, personnel and productivity; and related financial operations.
Prerequisites: ACCT 209; IDIS 343; industrial distribution major, junior or senior classification; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better.
IDIS 481 Seminar - Internship Preparation
Credit 1. 1 Lecture Hour.
Develop an understanding of the distribution industry and its opportunities; prepare students for summer internships; provide students with opportunities to network with industry and companies that will be hiring summer interns.
Prerequisite: Minimum of 60 credit hours.

IDIS 484 Professional Internship
Credits 2. 2 Other Hours.
Independent study and on-the-job supervised experience related to a professional area of interest in industrial distribution.
Prerequisites: IDIS 481; junior or senior classification.

IDIS 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Permits work in a special problem area on an individual basis with the intent of promoting independent reading, research and study; to supplement existing course offerings or subjects not presently covered.
Prerequisites: Senior classification and approval of instructor.

IDIS 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of industrial distribution.
Prerequisite: Approval of instructor.

IDIS 611 Current Issues in Industrial Distribution
Credits 3. 3 Lecture Hours.
Contemporary issues and trends affecting participants in the industrial distribution industry; opportunities and challenges for leaders identified and explored from the perspective of industrial distributors, manufacturers and end users.
Prerequisite: Enrollment in the MID program.

IDIS 614 Industrial Distributor Networks
Credits 3. 3 Lecture Hours.
Industrial distributor's network channel in distribution centers, warehouse management systems, hot-shot and standard truck fleets, forecasting and purchasing strategies for technical products; an examination of the integration of the field and inside sales force into distributor network strategy.
Prerequisite: Enrollment in the MID program.

IDIS 621 Industrial Distributor Processes I
Credits 3. 3 Lecture Hours.
Industrial distributor processes with an emphasis on assessing the value added effectiveness of specific industrial distributor initiatives.
Prerequisite: IDIS 644.

IDIS 622 Industrial Distributor Processes II
Credits 3. 3 Lecture Hours.
Continuation of IDIS 621.
Prerequisite: IDIS 621.

IDIS 624 Strategic Relationships for Industrial Distributors
Credits 3. 3 Lecture Hours.
Issues related to establishing and maintaining a beneficial relationship between distributors and manufacturers; developing effective buyer-seller relationships in the industrial distribution sector.
Prerequisite: Enrollment in the MID program.

IDIS 634 Quality Concepts in Industrial Distribution
Credits 3. 3 Lecture Hours.
Concepts, issues and techniques used to plan, analyze, control, and improve the quality of industrial distribution products and processes for increased consumer satisfaction.
Prerequisite: IDIS 655.

IDIS 644 Industrial Distributor Information and Technology Management
Credits 3. 3 Lecture Hours.
Industrial distributor's use of information systems to manage operations; combination of information systems and automation to achieve increased cross docking drop ships and automated tracking of industrial distributor operations metrics.
Prerequisite: IDIS 614.

IDIS 655 Global Distribution
Credits 3. 3 Lecture Hours.
Issues in global distribution on a small to large scale; emphasis on competitive global business strategies, cultural and exchange issues, distribution practices of other countries, global distribution networks, and transportation issues across the globe; an optional one week international trip to solidify foundation in international distribution concepts and strategies.
Prerequisite: IDIS 611.

IDIS 664 Distribution Profitability Analysis
Credits 3. 3 Lecture Hours.
Integrating advanced financial and accounting analysis useful to distribution executives in assessing the financial performance of distribution operations. Concepts and techniques in using financial statements and industrial distribution industry studies to manage cash flow, debt, working capital risk, capital budgeting, credit, receivables, inventory, personnel and profitability.
Prerequisite: IDIS 624.

IDIS 674 Industrial Distribution Enterprise
Credits 3. 3 Lecture Hours.
Explore changing environment of industrial distribution from globalization effects, environmental conditions, industrial distribution culture and organizational factors; focus on building, achieving and sustaining a competitive advantage.
Prerequisite: IDIS 664.

IDIS 685 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Individual and group problems dealing with application of industrial distribution theory and practice; foreign and domestic projects of special interest. May be repeated for credit.
Prerequisites: Enrollment in the MID program and approval of program director.

IDIS 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of industrial distribution. May be repeated for credit.
Prerequisite: Approval of MID program director.

IDIS 693 Professional Study
Credits 1 to 6. 1 to 6 Other Hours.
Approved professional study project in industrial distribution; preparation of a record of study summarizing the rationale, procedure and results of the completed study.
Prerequisite: Approval of MID program director.

INST-Interdisciplinary Studies
Courses

INST 210 Understanding Special Populations
Credits 3. 3 Lecture Hours.
Referral, assessment and categorization of special populations including physical, cognitive and affective characteristics; cultural, ethnic, economic and linguistic differences; giftedness; special education and compensatory programs; awareness of legislative history that results in rights for special populations.
Prerequisite: Sophomore classification or above.

INST 222 Foundations of Education in a Multicultural Society
Credits 3. 3 Lecture Hours.
Historical, philosophical and cultural foundations of education emphasizing education for a multicultural society.

INST 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in teaching, learning and culture. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

INST 301 Educational Psychology
Credits 3. 3 Lecture Hours.
Application of psychology to problems of teaching. Nature and operation of principles of learning, transfer of training; nature, measurement and significance of individual differences; conditions influencing efficiency of learning.
Prerequisite: Junior or senior classification.

INST 332 Second Language Instruction and Assessment
Credits 3. 3 Lecture Hours.
Techniques and methods of intensive English instruction for Limited English Proficient students; lesson planning and instructional modification; use of instructional strategies and appropriate assessment practices.
Prerequisite: Admission to teacher education.

INST 334 Assessment of English Language Learners
Credits 3. 3 Lecture Hours.
Theoretical and practical aspects of ESL/EFL testing, including formal and informal assessment procedures and instruments, assessments and referral and processes of ESL with special needs, and gifted ESL learners.
Prerequisites: INST 322 and INST 332.

INST 362 English as a Second Language Methods I
Credits 3. 3 Lecture Hours.
Basic principles of language acquisition, multiple approaches to second language acquisition; individual differences and second language acquisition; stages of second language development; multiple approaches to assessment.

INST 363 English as a Second Language Methods II
Credits 3. 3 Lecture Hours.
Strategies and techniques for teaching English language learners; curriculum design and material development, instruction of English language learners, content area instruction, and language assessment instruments; a historical perspective of the education of English language learners in United States' schools.
Prerequisite: INST 362.

INST 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in teaching learning and culture. May be repeated 2 times for credit.
Prerequisites: Junior or senior classification and approval of instructor.

INTS - International Studies

INTS 201 Introduction to International Studies
Credits 3. 3 Lecture Hours.
Introduction to the basic concepts and frameworks for analyzing global events and understanding the current international situation; for freshman and transfer international studies majors.

INTS 205 Current Issues in International Studies
Credit 1. 1 Lecture Hour.
Exploration of current issues and problems in International Studies through attendance of events, lectures by noted international academics and professionals, and in-class discussions. May be taken three times for credit.
Prerequisite: International studies major.

INTS 211/ENGL 211 Foundations in Cultural Studies
Credits 3. 3 Lecture Hours.
Introduction to history, influence and major ideas of Cultural Studies; use of culture as a means to critique social problems and understand social forces; analysis of culture in its relationship to power; participation in project investigating contemporary U.S. youth subcultures.
Cross Listing: ENGL 211/INTS 211.

INTS 251 Contemporary Issues in the Middle East
Credits 3. 3 Lecture Hours.
Exploration of current political and cultural issues in the Middle East.

INTS 285 Directed Studies
Credits 0 to 3. 0 to 3 Other Hours.
Individual supervision of readings or assigned projects in international studies. May be taken two times for credit.
Prerequisites: Approval of instructor and department head.

INTS 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Introduction to the broad range of disciplines and issues explored in the international studies curriculum. May be repeated for credit.
Prerequisite: Freshman or sophomore classification.

INTS 301 Theories of Globalization
Credits 3. 3 Lecture Hours.
Diverse global and international cultural processes in their economic and political contexts; analyses of theoretical lenses on transnationalism including diaspora, hybridity, liminality, marginality, cyborgism, nomadism, scapes and flows and others; case studies of global cultures.
Prerequisite: Junior or senior classification or approval of instructor.

INTS 321 Political Islam and Jihad
Credits 3. 3 Lecture Hours.
Interaction between Islamic movements and politics in various Middle Eastern countries; the meaning and evolution of jihad; the role of Islam as a tool for political and social mobilization.
Prerequisite: Junior or senior classification, or approval of instructor.
Cross Listing: HUMA 321 and RELS 321.

INTS 401 Urbanism and Modernism
Credits 3. 3 Lecture Hours.
Interdisciplinary examination of the transition from rural traditions to urban alienation, covering modernist currents in culture, history, politics, and society; exploration of the problems of urbanism as represented by the most renowned twentieth-century artists; study of such topics as modernist urban design, urban alienation, modernist cities, dystopia, and urbanism.
Prerequisites: International studies major; INTS 201.
INTS 403 Nations and Nationalisms
Credits 3. 3 Lecture Hours.
Interdisciplinary approach where nation is understood as modern political
entity distinct from country; examination of historical and philosophical
origins of idea of nationalism; theories on nationhood, national identity and
rise of nationalism; global variety of concrete test cases to highlight actual
origins of idea of nationalism; theories on nationhood, national identity and
entity distinct from country; examination of historical and philosophical
principles of human interaction in the face of cultural diversity.
Prerequisites: International studies major; INTS 201.

INTS 405 War and Memory
Credits 3. 3 Lecture Hours.
Examination of world wars, colonial wars, genocides, and historical crimes
from the late nineteenth century until the present; analysis of the changing
memory of those traumatic events as evident in historical accounts,
commemorations, film, and literature.
Prerequisites: International studies major; INTS 201.

INTS 407 Diversity in a Globalized World
Credits 3. 3 Lecture Hours.
Examination of the cultural constructs that arise through the encounters
with colonialism from the conquest of the Americas to the present; cultural
studies and literary analysis to identify and interrogate the common
principles of human interaction in the face of cultural diversity.
Prerequisites: International studies major; INTS 201.

INTS 409 Culture, Neoliberalism and Globalism
Credits 3. 3 Lecture Hours.
Examination of largely North Atlantic cultural forms and meanings that
arise in the context of neoliberalism from the late 1970’s to the present; cultural
studies and broad-based social analysis to identify and interrogate the many relational contexts where power circulates through cultural
objects and meanings.
Prerequisites: INTS 201; international studies major; junior or senior
classification.

INTS 410 Gender and the Global Modern
Credits 3. 3 Lecture Hours.
Relationship of the concepts of gender and modernity in the 20th and the
21st centuries from an international perspective; global theories of gender
and sex across genres.
Prerequisites: INTS 201; junior or senior classification or approval of
instructor.

INTS 481 Senior Seminar in International Studies
Credits 3. 3 Lecture Hours.
Capstone course designed to produce in-depth research projects; based
on student's international experience and specific area of expertise
acquired in major.
Prerequisites: International Studies major; INTS 201; senior
classification; completed international experience.

INTS 484 Directed Internship
Credits 3. 3 Other Hours.
Directed internship in a private firm, government or non-profit agency
outside the United States; provide on-the-job experience appropriate to
the student's program of work and career objectives. To be taken on a
satisfactory/unsatisfactory basis. Maximum of 3 credit hours may count
towards degree.
Prerequisites: Completion of 100- and 200-level language requirement;
junior or senior classification; approval of internship coordinator.

INTS 485 Directed Studies
Credits 0 to 3. 0 to 3 Other Hours.
Research problems and readings for students majoring in international studies; directed independent study of an international issue related to
student's area of interest.
Prerequisite: Junior or senior classification or approval of instructor.

INTS 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of international studies. May be
repeated for credit.
Prerequisites: INTS 201; junior or senior classification and approval of
instructor.

INTS 491 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the direction of faculty member in international
studies.
Prerequisites: INTS 201; junior or senior classification and approval of
instructor.

INTS 497 Independent Honors Study
Credits 3. 3 Other Hours.
Directed independent studies designed to produce a senior honors thesis;
based on international experience and interdisciplinary expertise acquired
in major.
Prerequisites: INTS major; honors candidate; completed international
experience.

ISEN - Indus & Systems Engr

Courses

ISEN 101 Introduction to Industrial Engineering
Credit 1. 1 Lecture Hour.
Introduction to industrial engineering; overview of the curriculum;
presentations by faculty and industry to familiarize with the department
and the scope of industrial engineering applications.

ISEN 220 Introduction to Production Systems
Credits 3. 3 Lecture Hours.
Introduction to manufacturing and production systems; overview of various
aspects of manufacturing systems; includes using Excel and VBA in
coding and evaluating models related to production systems and other
industrial engineering applications.
Co-requisites: MMET 181; STAT 211.
Prerequisite: CSCE 206.

ISEN 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Problems of limited scope in industrial engineering approved on an
individual basis intended to promote independent study.
Prerequisite: Approval of department head.

ISEN 302 Economic Analysis of Engineering Projects
Credits 2. 2 Lecture Hours.
Principles of economic equivalence; time value of money; analysis of
single and multiple investments; comparison of alternatives; capital
recovery and after-tax analysis of economic projects.
Prerequisite: MATH 152.
ISEN 303 Engineering Economic Analysis  
Credits 3.3 Lecture Hours.  
Principles of economic equivalence; time value of money; analysis of single and multiple investments; comparison of alternatives; capital recovery and tax implications; certainty; uncertainty; risk analysis; public sector analysis and break-even concepts.  
Prerequisite: MATH 152.

ISEN 314 Statistical Control of Quality  
Credits 3.2 Lecture Hours. 3 Lab Hours.  
Quality control with statistical principles applied to quality problems, including statistical analysis, density and distribution functions, control chart concepts, and process capability analysis; laboratory exercises for exposure to basic metrology and applied statistics for quality control applications in discrete-item manufacturing systems; introduction to six-sigma principles including DMAIC and variance reduction strategies.  
Prerequisite: STAT 212.

ISEN 315 Production Systems Planning  
Credits 3.3 Lecture Hours.  
Principles, models, and techniques for planning, analysis, and operation of integrated production and distribution systems; application of non-linear optimization and linear, integer, and dynamic programming models and solution methods as appropriate to capacity planning, aggregate planning, inventory planning and control under deterministic and stochastic demands, push (MRP) and pull (JIT) material flow management, production lot sizing, supply chain planning, assembly line balancing, and scheduling.  
Prerequisites: ISEN 220; MATH 304.  
Corequisite: ISEN 420.

ISEN 316 Production Systems Operations  
Credits 3.3 Lecture Hours.  
Analytical principles of manufacturing systems design, analysis and control; emphasis on stochastic analysis; role of variability and impact on cycle time; push versus pull production strategies including Kanban and constant wip control; probability, queuing theory, Little’s Law, heavy traffic approximations, queuing networks, and lean engineering principles.  
Prerequisites: ISEN 220, ISEN 424; MATH 304.

ISEN 333 Project Management for Engineers  
Credits 3.3 Lecture Hours.  
Basic project management for engineering undergraduates; project development and economic justification; estimating; scheduling; network methods; critical path analysis; earned value management; recycling and rework; project organizational structures; project risk assessment; resource allocation; ethics; characteristics of project managers.  
Prerequisite: Junior or senior classification in Dwight Look College of Engineering.  
Cross Listing: CVEN 333 and MEEN 333.

ISEN 360 Lean Thinking and Lean Engineering in the Process Industries  
Credits 3.3 Lecture Hours.  
Philosophical, managerial, and operational principles of lean thinking within the context, tools, and practices of lean engineering; emphasis on the pharmaceutical and process industry; design of lean systems, lean cell design, modeling of lean manufacturing systems, and operation of manufacturing cells; queuing network theory for the analysis of lean systems.  
Prerequisites: STAT 211; junior or senior classification for students other than INEN majors.

ISEN 411 Engineering Management Techniques  
Credits 3.3 Lecture Hours.  
Techniques relating to managing engineering activities; engineer’s transition into management; engineering managerial functions; motivation of individual and group behavior; productivity assessment/improvement; managing the quality function and communications.  
Prerequisite: Senior classification in industrial engineering.

ISEN 414 Total Quality Engineering  
Credits 3.2 Lecture Hours. 3 Lab Hours.  
Principles of total quality engineering; total quality management philosophy, engineering approaches for designing quality into products and processes; off-line experimentation methods for the robust design; emphasis on teamwork and continuous quality improvement.  
Prerequisite: STAT 211; junior or senior classification.

ISEN 416 Facilities Location, Layout and Material Handling  
Credits 4.3 Lecture Hours. 3 Lab Hours.  
Analytical treatment of facilities location, physical layout, material flow and handling, combined with heuristic algorithms to assist in the design of production/service facilities; fundamental concepts applied through a sequence of design projects.  
Prerequisites: ISEN 315; ISEN 316 or registration therein.

ISEN 420 Operations Research I  
Credits 3.3 Lecture Hours.  
Development and application of fundamental deterministic analytical methods including linear programming, integer programming, dynamic programming and nonlinear optimization.  
Prerequisite: MATH 304 or equivalent.

ISEN 421 Operations Research II  
Credits 3.3 Lecture Hours.  
Development and application of probabilistic analytical methods including Markov chains, queuing systems and digital simulation modeling.  
Prerequisites: MATH 304 or equivalent; STAT 212.

ISEN 424 Systems Simulation  
Credits 3.2 Lecture Hours. 3 Lab Hours.  
Systems simulation structure, logic and methodologies; generation of random numbers and random variates; system simulation languages, models and analysis; applications to a variety of systems such as transportation, supply chain modeling, manufacturing and service systems.  
Prerequisite: STAT 212.

ISEN 425 Design and Analysis of Industrial Systems with Simulation  
Credits 3.2 Lecture Hours. 3 Lab Hours.  
In-depth study into the design-modeling and subsequent analysis of contemporary production/service systems; factory/service systems are modeled using the ARENA/SIMAN V simulation-animation language; emphasis is placed on the critical analysis of alternative flow designs of modeled systems using flow and economic parameters to assess system improvement.  
Prerequisites: ISEN 303 and ISEN 424.

ISEN 430 Human Factors and Ergonomics  
Credits 3.3 Lecture Hours.  
Human biological, ergonomic, and psychological capabilities and limitations; techniques and procedures for developing and applying the principles of human factors engineering to systems design; stresses interdisciplinary nature of the subject.  
Prerequisite: Junior or senior classification.
ISEN 440 Systems Thinking  
Credits 3.3 Lecture Hours.  
Systems thinking process, systems of systems and the fundamental considerations associated with the engineering of large-scale systems, or systems engineering including systems modeling, design and the system development process.  
Prerequisites: MATH 304 or approval of instructor; junior or senior classification.

ISEN 450 Healthcare Systems Engineering  
Credits 3.3 Lecture Hours.  
Explores components of healthcare system, existing problems in healthcare systems; need for engineering to analyze healthcare system problems; application of industrial engineering tools in improving healthcare system; role of industrial engineering in addressing healthcare policy issues.  
Prerequisites: ISEN 314, ISEN 420, ISEN 424, or approval of instructor; junior or senior classification.

ISEN 459 Industrial Engineering Systems Design  
Credits 3.1 Lecture Hour. 6 Lab Hours.  
Capstone design course emphasizing modeling, analysis and design of industrial, manufacturing, and service systems; integrates knowledge gained from all required industrial engineering courses in a comprehensive design project, to be taken in the final semester of undergraduate studies.  
Prerequisites: ISEN 314, ISEN 316, ISEN 416.

ISEN 485 Directed Studies  
Credits 1 to 6.1 to 6 Other Hours.  
Permits work on special project in industrial engineering. Project must be approved by department head.  
Prerequisite: Senior classification in industrial engineering.  
ISEN 489 Special Topics in...  
Credits 1 to 5.1 to 5 Lecture Hours. 0 to 5 Lab Hours.  
In-depth study of areas of current student interest and recent advances; normally used for first time offering of new courses.  
Prerequisite: Approval of instructor.

ISEN 601 Location Logistics of Industrial Facilities  
Credits 3.3 Lecture Hours.  
Selection of the optimal locations of industrial plants and distribution centers through analytical modeling of the costs of inventory storage, transportation, utilities, labor supply and other cost components.  
Prerequisites: ISEN 620.

ISEN 602 Applications of Random Processes  
Credits 3.3 Lecture Hours.  
Introduction to probability and random processes as a basis for studying topics in industrial engineering and operations research.  
Prerequisites: ISEN 609; STAT 212 or STAT 601.

ISEN 603 Advanced Logistics  
Credits 3.3 Lecture Hours.  
Topics in logistics including measures of logistical systems performance, facilities location—allocation, production/distribution system design, transportation network design, vehicle routing; emphasis on mathematical modeling based on large scale integer programs and solution approaches for general network design problems.  
Prerequisites: ISEN 601, ISEN 622, ISEN 623, ISEN 668 or approval of instructor.

ISEN 605 Material Handling Systems  
Credits 3.3 Lecture Hours.  
Analysis and design of integrated material handling systems; automatic storage and retrieval of unit loads, and identifying and establishing boundary conditions on key parameters required to specify the desired system required for equipment vendors to design appropriate hardware.  
Prerequisites: ISEN 420; ISEN 416.

ISEN 608 Industrial Case Analysis  
Credits 3.3 Lecture Hours.  
Practice in applications of principles to the solution of actual case problems involving broad management decisions.  
Prerequisite: Approval of instructor.

ISEN 609 Probability for Engineering Decisions  
Credits 3.3 Lecture Hours.  
Introduction to probability and stochastic processes for characterization of uncertainty in engineering decisions.  
Prerequisite: Approval of instructor.

ISEN 611 Foundations of Technology Evaluation and Assessment  
Credits 3.3 Lecture Hours.  
Quantifying gambles arising in engineering activities associated with the design, deployment, and operations of technology; analytical foundations of technology evaluation and assessment from an engineering perspective; focus on examination of probability models supporting quantification of value and risk.  
Prerequisites: ISEN 609 or approval of instructor.

ISEN 612 Design by Reliability  
Credits 3.3 Lecture Hours.  
Quantitative reliability analysis in engineering design. Reliability methods applicable to risk based design, component reliability and degradation, static and dynamic system reliability modeling and analysis, life testing, stress/strength analysis, and fault tree analysis.  
Prerequisites: ISEN 609; STAT 414.

ISEN 613 Engineering Data Analysis  
Credits 3.3 Lecture Hours.  
Selected topics in probability and data analysis for quality in engineering problems; measurement principles, data collection and data analysis to solve quality engineering problems. Introduction to courses in the assurance sciences-reliability, maintainability, quality control and robust design.

ISEN 614 Advanced Quality Control  
Credits 3.3 Lecture Hours.  
Advanced methods applied to quality control and anomaly detection; classical treatments and recent developments in statistical process control; evaluation, design and maintenance of quality control programs; focus on monitoring and root cause identification.  
Prerequisite: STAT 212 or STAT 601.

ISEN 615 Production and Inventory Control  
Credits 3.3 Lecture Hours.  
Model development for inventory management and for production planning; production control models for line balancing, lot sizing, dispatching, scheduling, releasing, kitting, MRP and just-in-time with treatment of flexible manufacturing and assembly.  
Prerequisites: ISEN 620; ISEN 609.
ISEN 616 Design and Analysis of Industrial Experiments
Credits 3.3 Lecture Hours.
Fundamental theory, concepts and procedures required for industrial experimental design, statistical data analysis, and model building, with emphasis on engineering formulations and applications. One-factor experiments with and without restrictions on randomization, treatment comparison procedures, Latin and other squares, factorial experiments, full and fractional two-level factorial experiments, blocking in factorial designs, response surface methodologies and introduction to Taguchi methods.
Prerequisite: STAT 212 or STAT 601.

ISEN 617 Quantitative Models for Supply Chain Coordination
Credits 3.3 Lecture Hours.
Concepts, complexities, and models pertaining to supply chain management and relate these to recent practical initiatives; includes channel coordination models, supply chain contracting, and vendor-managed, inventory models.
Prerequisites: ISEN 615, ISEN 623, and ISEN 609 or STAT 615 or approval of instructor.

ISEN 618 Stochastic Processes in the Assurance Sciences
Credits 3.3 Lecture Hours.
Stochastic processes necessary to deal with advanced problems in reliability, maintainability and other related areas.
Prerequisite: ISEN 602.

ISEN 619 Analysis and Prediction
Credits 3.3 Lecture Hours.
Data-mining methods and data-driven models; statistical model building and parameter estimation for Markov processes; sampling of dynamic systems with random disturbances; on-line identification algorithms; design of time-series control charts for process monitoring; multivariate analysis; applications using real data.
Prerequisite: ISEN 609.

ISEN 620 Survey of Optimization
Credits 3.3 Lecture Hours.
Theory and numerical methods for deterministic linear and nonlinear optimization; topics include linear programming, unconstrained-nonlinear optimization, constrained-nonlinear optimization, Lagrange and K-K-T conditions, and numerical algorithms.
Prerequisite: MATH 304 or MATH 311.

ISEN 621 Heuristic Optimization
Credits 3.3 Lecture Hours.
Focus on heuristic optimization methods that search beyond local optima; includes neighborhood search methods and advanced search strategies such as genetic algorithms, simulated annealing, neural networks, tabu search, and greedy randomized adaptive search procedures.
Prerequisites: ISEN 620 or ISEN 622 or approval of instructor.

ISEN 622 Linear Programming
Credits 3.3 Lecture Hours.
Development of the mathematics and algorithms associated with linear programming; convex sets and cones, polyhedral sets, duality theory, sensitivity analysis, simplex, revised simplex and dual simplex methods; also covered are bounded variables, column generation, decomposition, integer programming; computer assignment.
Prerequisite: MATH 304.

ISEN 623 Nonlinear and Dynamic Programming
Credits 3.3 Lecture Hours.
Understanding of algorithms for nonlinear optimization; development of optimality conditions and different types of algorithms for unconstrained and constrained problems; formulation and solution of many types of discrete dynamic programming problems.
Prerequisite: MATH 304.

ISEN 624 Applied Distribution and Queueing Theory
Credits 3.3 Lecture Hours.
Queueing theory and its applications; single and multiple channels, priorities, balking, batch arrivals and service, and selected non-Markovian topics.
Prerequisite: ISEN 609 or ECEN 646.

ISEN 625 Simulation Methods and Applications
Credits 3.2 Lecture Hours. 3 Lab Hours.
Fundamental methodologies of simulation modeling; random number and variate generation, statistical analysis of model output, and discrete event modeling using a commercial simulation language.
Prerequisite: STAT 212 or STAT 601.

ISEN 627 Engineering Analysis for Decision Making
Credits 3.3 Lecture Hours.
Principles and application of techniques in analysis of decision processes involving engineering systems under uncertainty. Areas of utility and information theory as related to quantification of information for decision-making.
Prerequisites: ISEN 609; STAT 601 or approval of instructor.

ISEN 629 Engineering Optimization
Credits 3.3 Lecture Hours.
Develops a modern framework for studying nonlinear programming problems using convex analysis; convex sets and cones, separating hyperplanes, sub-differentiability, conjugate transforms, duality theory and parametric analysis; applications of the principles and methods will be studied.
Prerequisite: ISEN 623; corequisite: MATH 409.

ISEN 630 Human Operator in Complex Systems
Credits 3.3 Lecture Hours.
Basic understanding of the theory and practice of human factors engineering. Topics are presented within the framework of humans as functioning systems and their requirements when incorporated in hardware and software systems.

ISEN 631 Cognitive Systems Engineering
Credits 3.3 Lecture Hours.
Analyze how artifacts, displays, social interaction and factors such as stress, time pressure, competing demands and uncertainty affect human cognitive functions such as perception, attention, memory, decision-making and problem-solving in joint human-machine systems; user-centered design techniques, research and evaluation methods introduced and applied to a design project.
Prerequisites: ISEN 635, ISEN 430/ISEN 630, or approval of instructor.

ISEN 635 Human Information Processing
Credits 3.3 Lecture Hours.
Perceptual and cognitive issues as related to the design of man-machine systems; perception, central processes, decision making and other performance aspects of the human component as an information processor.
Prerequisite: ISEN 430 or approval of instructor.
ISEN 636 Large-Scale Stochastic Optimization
Credits 3.3 Lecture Hours.
Introduction to models, theory and computational methods for large-scale stochastic optimization including decomposition-coordination algorithms for stochastic programming such as generalized Benders decomposition and resource-price directive methods; emphasis on practical algorithm implementation and computational experimentation.
Prerequisites: ISEN 620 or ISEN 622, STAT 610 and CSCE 602 or approval of instructor.

ISEN 637 Stochastic Dynamic Programming
Credits 3.3 Lecture Hours.
Methodologies for stage-wise stochastic-decision processes; includes finite-horizon models, infinite-horizon discounted total cost models, and average cost models; applications of methods to various situations.
Prerequisites: ISEN 609 and ISEN 622, or approval of the instructor.

ISEN 638 Polyhedral Theory and Valid Inequalities
Credits 3.3 Lecture Hours.
Advanced knowledge of polyhedral theory and valid inequalities for (mixed) integer programming; introduction to fundamental concepts in polyhedral theory and several approaches to generation of valid inequalities; includes state-of-the-art advancements and current avenues of research.
Prerequisite: ISEN 668.

ISEN 640 Systems Thinking and Analysis
Credits 3.3 Lecture Hours.
Introduction to the systems thinking process and the fundamental considerations associated with the engineering of large-scale systems, or systems engineering.
Prerequisite: MATH 304 or approval of instructor.

ISEN 641 Systems Engineering Methods and Frameworks
Credits 3.3 Lecture Hours.
Concepts, methodology, methods and tools for discovery, definition, analysis, design, creation, and sustainment of systems involving information, physical, and human elements; architecture modeling methods include IDEF/UPDM; systems engineering frameworks include DoDAF/MoDAF, and Zachman; analysis tools include executable methodologies to assess consistency, interoperability and performance.
Prerequisites: MATH 304 or approval of instructor.

ISEN 643/CVEN 654 Strategic Construction and Engineering Management
Credits 3.3 Lecture Hours.
Strategic and systems perspectives applied to construction and engineering management projects, organizations, and industries; system dynamics methodology to model construction and engineering systems; understanding drivers of performance; feedback and high leverage points for performance improvement.
Prerequisite: Graduate classification or approval of instructor.
Cross Listing: CVEN 654/ISEN 643.

ISEN 644/CVEN 644 Project Risk Management
Credits 3.3 Lecture Hours.
Identifies causes of risks in projects; discusses probabilistic description of risks and formulation of risk models; Bayesian methods for revising probabilities; qualitative and quantitative risk assessment; setting contingencies on budgets and schedules; risk mitigation and risk management; handling technological risk; Utility theory and game theory in management of risks.
Prerequisite(s): STAT 601 or equivalent; graduate status in Engineering, approval of instructor.
Cross Listing: CVEN 644.

ISEN 645 Lean Thinking and Lean Manufacturing
Credits 3.3 Lecture Hours.
Introduces the principles of lean thinking in modern manufacturing systems; philosophical, managerial and organizational requirements studied; lean manufacturing quantitative modeling methodologies, lean manufacturing cell design and case study analysis.
Prerequisites: ISEN 609 or approval of instructor.

ISEN 650 Healthcare Delivery Systems Modeling and Analysis
Credits 3.3 Lecture Hours.
Challenges in modeling and analysis of healthcare systems; deterministic and stochastic approaches to model and analyze healthcare systems; existing and emerging policies in healthcare and effects on healthcare system models.
Prerequisite: ISEN 609, ISEN 620, or approval of instructor.

ISEN 654/MEEN 648 Manufacturing Systems Planning and Analysis
Credits 3.3 Lecture Hours.
The systems perspective of a computer integrated manufacturing system; manufacturing and its various levels and the planning and control of product movement through the production system in the context of using realtime control, multiprocessor systems, network architectures and databases.
Prerequisite: ISEN 420.
Cross Listing: MEEN 648/ISEN 654.

ISEN 655/MEEN 650 Control Issues in Computer Integrated Manufacturing
Credits 3.3 Lecture Hours.
Examines the nature of computer aided manufacturing systems with emphasis on control; an architecture for control of CAM systems is presented; control issues, problems and procedures to control CAM systems are studied and developed.
Prerequisite: Approval of instructor.
Cross Listing: MEEN 650/ISEN 655.

ISEN 656 Virtual Manufacturing
Credits 3.3 Lecture Hours.
Focus on principles of virtual reality and 3-D graphics and their application in manufacturing, automation and simulation; virtual reality modeling, motion, collision detection and networking issues studied and developed.
Prerequisite: Approval of instructor.

ISEN 659 Modeling and Analysis of Manufacturing Systems
Credits 3.3 Lecture Hours.
Analytical models applied to the description, design operation and control of manufacturing processes and systems; includes serial assembly, jobshops, FMS and cellular manufacturing configurations.
Prerequisites: ISEN 609.

ISEN 660 Quantitative Risk Analysis
Credits 3.3 Lecture Hours.
Fundamental concepts, techniques, and applications of quantitative risk analysis and risk-informed decision making for students in all engineering fields. Practical uses of probabilistic methods are demonstrated in exercises and case studies from diverse engineering areas.
Prerequisites: Graduate or senior classification.
Cross Listing: CHEN 660 and SENG 660.
ISEN 661 Network-Based Planning and Scheduling Systems
Credits 3. 3 Lecture Hours.
Fundamental theory, mathematical modeling, and algorithms of network flow models including shortest path models, maximum flow and cost minimization models; out-of-kilter algorithm; pure and generalized network specializations of the primal simplex method; introduction to multi-commodity networks.
Prerequisite: ISEN 620 or 622.
ISEN 662 Production Economics
Credits 3. 3 Lecture Hours.
Develop an understanding of the analytical and empirical techniques required to conduct an analysis of the magnitude and the sources of productivity change; programming and regression approaches to analyze industries include manufacturing, energy, and service systems.
Prerequisites: ISEN 303 and ISEN 620 or approval of instructor.
ISEN 663 Engineering Management Control Systems
Credits 3. 3 Lecture Hours.
Integration of human relations, planning and control concepts, systems analysis and design, and principles of management oriented toward engineering functions within an organization; organizational design and administration as they impact along the product life cycle, i.e., research, design, development, production and use.
ISEN 664 Principles of Scheduling
Credits 3. 3 Lecture Hours.
Scheduling and sequencing for production, assembly, supply chain, logistics and service operations; relevant solution methods including algebraic, branch and bound, Lagrangian relaxation, facet generation, branch and price, heuristics and simulation; computational complexity issues.
Prerequisite: ISEN 620 or ISEN 622 or approval of instructor.
ISEN 667 Engineering Economy
Credits 3. 3 Lecture Hours.
Fundamental concepts and advanced techniques of engineering economic analysis; evaluation of alternative capital investments considering income taxes, depreciation and inflation; discounted cash flow analysis of competing projects, break-even analysis and determination of rate of return on investment. Risk and uncertainty in engineering analysis.
Prerequisite: ISEN 303 or approval of instructor.
ISEN 668 Integer Programming
Credits 3. 3 Lecture Hours.
Formulation principles and general approaches for solving integer (and mixed, integer linear) programs including preprocessing, cutting plane methods, branch and bound, branch and cut, branch and price, and Lagrange relaxation; classical problem structures with special-purpose solution algorithms; fundamental theory of polyhedra, methods to generate valid inequalities and computational complexity.
Prerequisite: ISEN 620 or ISEN 622.
ISEN 669 Software Tools for Stochastic Decision Support Analysis
Credits 3. 3 Lecture Hours.
Overview of stochastic decision analysis; focus on Palisade Corporation’s Decision Tools Suite of Excel add-in macros; topics include sensitivity analysis of Excel models, decision tree construction and analysis, and simulation within Excel.
Prerequisite: STAT 630 or equivalent and ISEN 667.
ISEN 681 Seminar
Credit 1. 1 Lecture Hour.
Opportunity to present research in a professional atmosphere. Presentations are not restricted to thesis or problem research. Acquaints the student with departmental research activities and procedures in documenting research.
ISEN 684 Professional Internship
Credits 1 to 16. 1 to 16 Other Hours.
On-the-job training under supervision of practicing engineers in settings appropriate to professional objectives. May be repeated for credit.
Prerequisite: Approval of committee chair and department head.
ISEN 685 Directed Studies
Credits 1 to 12. 1 to 12 Other Hours.
Special topics not within scope of thesis research and not covered by other formal courses.
Prerequisite: Graduate classification in industrial engineering.
ISEN 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of industrial engineering. May be repeated for credit.
Prerequisite: Approval of instructor.
ISEN 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research in industrial engineering field; content and credit dependent upon needs of individual student.
ISEN 692 Professional Study
Credits 1 to 9. 1 to 9 Other Hours.
Approved professional study or project. May be taken more than once, but not to exceed 4 hours of credit toward a degree. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisite: Approval of instructor.
ISYS - Mgmt Info Systems
Courses
ISYS 209 Business Information Systems Concepts
Credits 3. 3 Lecture Hours.
Introduction to the use of computers in data and document management and as a problem-solving tool for business; fundamental concepts of information technology and theory; opportunities to use existing application software to solve various business information systems oriented problems. May not be used to satisfy degree requirements for majors in business.
Prerequisite: For students other than business and agribusiness majors.
ISYS 210 Fundamentals of Information Systems
Credits 3. 3 Lecture Hours.
Introduction to information systems concepts; study of information systems in the functional areas of business; overview of hardware, software and popular operating systems; study of problem solving tools; human factors.
Prerequisite: For business majors.
ISYS 250 Business Programming Logic and Design
Credits 3. 3 Lecture Hours.
Development of structured and object-oriented program logic and design in solving business programming problems; writing, documenting, debugging and testing computer code; emphasis on good coding techniques and logical thinking.
Prerequisite: ISYS 210 or approval of instructor.
ISYS 281 Professional Development Information Systems Seminar  
Credit 1.1 Other Hour.  
Exposure to professional issues, contemporary information systems topics, potential MIS careers and employers. May be taken three times for credit.  
Prerequisite: Admission to Mays Business School; intend to major in management information systems.  

ISYS 300/SCMT 300 Business Communications I  
Credit 1.1 Lecture Hour.  
Proper techniques for writing major-specific business communications; progress report, memorandum, letter, executive summary; verbal communications via phone call and person-to-person communications; critiques of personal and peer writing.  
Prerequisites: ISYS 250; admission to upper division in Mays Business School.  
Cross Listing: SCMT 300/ISYS 300.  

ISYS 310 Network Communications and Infrastructure  
Credits 3.3 Lecture Hours.  
Concepts, technologies and applications of on-line and network-based systems; analysis and design of data communications; requirements in an information system environment; impact on business organizations; installation, configuration and management of virtual servers.  
Prerequisite: ISYS 250; admission to upper division in Mays Business School.  

ISYS 315 Database Programming  
Credits 3.3 Lecture Hours.  
Use and application of Structured Query Language (SQL); Database Management Systems (DBMS) in the solution of business problems; database programming.  
Prerequisites: ISYS 310; ISYS 320; or approval of instructor.  

ISYS 320 Business Systems Analysis and Design  
Credits 3.3 Lecture Hours.  
Techniques and methods currently used in system analysis and design including object oriented methods; use of automated tools to support systems development.  
Prerequisite: ISYS 250; admission to upper division in Mays Business School.  

ISYS 325 Business Object Oriented Programming with Java  
Credits 3.3 Lecture Hours.  
Introduction of abstract data types, inheritance, object identity, polymorphism as they relate to building business objects and business classes; use of Java programming language depicting the object orientation concepts; use of class libraries and Java packages for business object construction.  
Prerequisites: Admission to upper division in Mays Business School; ISYS 250.  

ISYS 400/SCMT 400 Business Communications II  
Credit 1.1 Lecture Hour.  
Development of critical interpersonal and oral communication skills; strategies for positive team development; conflict resolution; oral presentations and information elicitation; production of effective visual aids.  
Prerequisites: Senior classification; MISY majors only.  
Cross Listing: SCMT 400/ISYS 400.  

ISYS 410 Management of Information Systems  
Credits 3.3 Lecture Hours.  
Strategic management of information systems; change and risk management processes during information systems implementation; role of information systems to support business goals; writing business cases for request for proposals and responses; project management techniques.  
Prerequisite: ISYS 310; ISYS 320; or approval of instructor.  

ISYS 415 Information Systems Capstone Project  
Credits 3.3 Lecture Hours.  
Design and development of information system software based on technical specifications; multi-platform environment; database server and web server software deployment.  
Prerequisites: ISYS 315; ISYS 410; or approval of instructor.  

ISYS 420 Web-Enabled Applications  
Credits 3.3 Lecture Hours.  
Distributed business applications using the World Wide Web; advanced discussions of the concepts of internet, intranet, extranet; different methods to design web-enabled applications; active web applications; cutting edge website design; legacy to web integration; use of web-oriented languages.  
Prerequisites: ISYS 315.  

ISYS 425 Complex Business Application Design  
Credits 3.3 Lecture Hours.  
Business application development alternatives; COM and CORBA object models; use of Visual Basic; use of ActiveX controls, ActiveX Servers and ActiveX Documents.  
Prerequisites: ISYS 250; senior classification.  

ISYS 450 Business Intelligence and Data Mining  
Credits 3.3 Lecture Hours.  
Rationale for Business Intelligence and data mining through business case studies; lab training using data mining software; and process of data mining by using commercial data mining software on large data sets.  
Prerequisites: Grade of “C” or better in SCMT 303 or equivalent; junior or senior classification.  

ISYS 455 Business Information Security and Risk Management  
Credits 3.3 Lecture Hours.  
Examines the deployment and utilization of information technologies by businesses, governments and not for profit organizations to deliver services, with applications in banking and financial advisory services, healthcare, and federal, state and local governments.  
Prerequisite: ISYS 310.  

ISYS 460 E-Services  
Credits 3.3 Lecture Hours.  
Examines the deployment and utilization of information technologies by businesses, governments and not for profit organizations to deliver services, with applications in banking and financial advisory services, healthcare, and federal, state and local governments.  
Prerequisite: Senior classification in business or approval of instructor.  

ISYS 481 Information Systems Seminar  
Credit 1.1 Other Hour.  
Exposure to professional issues, contemporary information systems topics, potential MIS careers and employers. May be taken three times for credit.  
Prerequisite: Admission to upper division in Mays Business School; or approval of instructor.
ISYS 484 Management Information Systems Internship
Credits 1 to 4. 1 to 4 Other Hours.
A directed internship in an organization to provide students with a
learning experience supervised by professionals in organizational settings
appropriate to the student's professional objectives. Must be taken on a
satisfactory/unsatisfactory basis.
Prerequisites: Management Information Systems major and approval of academic advisor and instructor.

ISYS 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed study of selected problems in an area of management information
systems not covered in other courses.
Prerequisites: Admission to upper division in Mays Business School and approval of academic advisor and instructor.

ISYS 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topic in an identified field of management information systems.
Prerequisites: Admission to upper division in Mays Business School and approval of academic advisor and instructor.

ISYS 601 Fundamentals of Business Programming
Credits 3. 3 Lecture Hours.
Business Application Development using both procedural and object-
oriented programming techniques; use of component based software
design and development for distributed business software systems.
Prerequisite: Graduate business classification or approval of instructor.

ISYS 610 Business Data Communications
Credits 3. 3 Lecture Hours.
Concepts and technology of on-line and network-based systems in
business; analysis of data communication requirements, design, selection
and application of network technologies including wide and local area
networks, distributed processing, network architecture, and systems
management and control; software simulation projects emphasized.
Classification 6 students may not enroll in this course.
Prerequisites: Graduate classification.

ISYS 612 Management Information Systems
Credits 1 to 3. 1 to 3 Lecture Hours.
Concepts, theories, and the strategic role of information systems as
applied to business organizations; highly integrative/ crossed functional in
nature. Classification 6 students may not enroll in this course.
Prerequisite: Enrollment is limited to MBA students.

ISYS 615 Business Database Systems
Credits 3. 3 Lecture Hours.
Information processing and management involving applications and
user orientation in a business environment using commercially available
database management systems.
Prerequisite: Knowledge of one programming language.

ISYS 620 Systems Analysis and Design
Credits 3. 3 Lecture Hours.
Methodologies, techniques, and tools for information systems analysis
and design; the analysis and logical design of business processes and
management information systems focusing on the systems development
life cycle; techniques for logical system design.
Prerequisite: ISYS 615 or concurrent enrollment.

ISYS 622 Advanced Data Management
Credits 3. 3 Lecture Hours.
Data/database management and advanced SQL techniques; issues of
data security, backup and recovery, large scale databases, master data
management, concurrent user data access, scalability, and policies.
Prerequisites: ISYS 615 or equivalent; graduate classification in business.

ISYS 624 Advanced Systems Analysis and Design
Credits 3. 3 Lecture Hours.
Advanced topics in business systems analysis and design; alternative
methodologies such as agile development, extreme programming,
Rational Unified Process; Unified Modeling Language; bench marking and
best practices for systems development; cost/benefit analysis, estimation
and budgeting for business information systems; testing; patterns, domain-
driven design; process modeling; service-oriented architecture and cloud
computing.
Prerequisite: ISYS 620 or equivalent; graduate classification in business.

ISYS 630 MIS Project Management and Implementation
Credits 3. 3 Lecture Hours.
Advanced coverage of systems development topics with emphasis on the
management and implementation of business computing systems; group
project orientation to include feasibility analysis, alternative evaluation and
selection, and management approval; use of software engineering tools
where appropriate. Classification 6 students may not enroll in this class.
Prerequisite: ISYS 620.

ISYS 631 Information Systems Design and Development Project
Credits 3. 3 Lecture Hours.
Design and delivery of functional, multi-platform application system using
current technologies; user interface design emphasized; issues of mobile
device forms, software delivery, and development.
Prerequisites: Graduation classification; ISYS 622; ISYS 630.

ISYS 635 Business Information Security
Credits 3. 3 Lecture Hours.
Explores the business, managerial, and technological aspects of
information security; analysis, design, and implementation issues
surrounding effective information security; authentication, authorization,
availability, business continuity planning, confidentiality, disaster recovery,
encryption, firewalls, fraud protection, security policy development,
integrity, risk management, virus protection, VPNs and wireless security.
Classification 6 students may not enroll in this course.
Prerequisite: ISYS 610.

ISYS 637 Data Warehousing
Credits 3. 3 Lecture Hours.
Provides an understanding of the process by which a data warehouse
system is designed and developed along with the underlying concepts
and software systems; includes OLAP models and their differences with
standard OLTP models.
Prerequisite: ISYS 615 or approval of instructor.

ISYS 640 Information Systems Sourcing
Credits 3. 3 Lecture Hours.
Identify the challenges of information systems sourcing, as well as the
costs, risks, rewards, and strategies involved in sourcing situations; focus
on global sourcing of professional services, including IT, business process,
and knowledge process outsourcing; issues such as vendor management,
legal issues, distributed work teams, and comparing alternative sourcing
strategies.
Prerequisites: ISYS 624 or equivalent or approval of instructor; graduate classification in business.
ISYS 643 Corporate Information Planning  
Credits 3.3 Lecture Hours.  
Concepts regarding the design and use of computer-based management information and decision support systems; combinations of computing hardware and software and design concepts evaluated to meet managers' information needs. Classification 6 students may not enroll in this course.  
Prerequisites: ISYS 615 or equivalent or approval of instructor.

ISYS 645 IT Security Controls  
Credits 3.3 Lecture Hours.  
Familiarization with planning, design, and implementation of controls to minimize risks to business information; focus on the importance of managing business information security; introduction to the tools, concepts and theories to safeguard an organization's information systems and IT assets; understanding of cryptography and application, operations, and physical security.  
Prerequisite: ISYS 635.

ISYS 646 E-Services  
Credits 3.3 Lecture Hours.  
Examines the deployment and utilization of information technologies by businesses, governments and not-for-profit organizations to deliver services, with applications in banking and financial advisory services, healthcare, and federal, state and local governments.  
Prerequisite: ISYS 620.

ISYS 650 Business Data Mining  
Credits 3.3 Lecture Hours.  
Rationale for business Data Mining through case studies of business applications; process of data mining by using commercial Data Mining software on very large data sets; half of the course devoted to lab training in the use of Data Mining software including SAS Enterprise Miner and SPSS Clementine.  
Prerequisite: STAT 652 or approval of instructor.

ISYS 652 Customer Relationship Management and Technologies  
Credits 3.3 Lecture Hours.  
Theory and application of information technology in customer relationship management, construction of CRM infrastructures in organizations.  
Prerequisite: ISYS 615.

ISYS 654 E-Commerce Technologies  
Credits 3.3 Lecture Hours.  
Theory and application of constructing E-Commerce sites, including n-tier architecture and technologies, web servers, server interactions with databases, and transaction managers.  
Prerequisite: ISYS 615 or equivalent.

ISYS 655 Security Management and Compliance  
Credits 3.3 Lecture Hours.  
Familiarization with managerial and legal aspects of business information security; focus on importance of managing business information security and theories to help safeguard an organization's information systems and IT assets; understanding of Security Architecture and Design, Business Continuity and Disaster Recovery Planning, Laws Investigation and Ethics.  
Prerequisite: ISYS 635.

ISYS 656 Global Information Systems  
Credits 3.3 Lecture Hours.  
Impact and the central role of Information Systems (IS) on globalization of business; issues of deployment of information systems and technology in international commerce, global IS environmental variables such as technology, legal, political, economic, social and cultural. Classification 6 students may not enroll in this course.  
Prerequisite: ISYS 610 or equivalent, or approval of instructor.

ISYS 670 IT Consulting  
Credits 3.3 Lecture Hours.  
Concerns with the practice of IT consulting; and develops an understanding of consulting practices, business development and revenue management, client relationships, team-based knowledge, knowledge services, technology evaluation, selection and integration, collaboration tools, business process and organizational change, and large application implementations; involves a full semester client-based project.  
Prerequisites: ISYS 615, ISYS 620, and SCMT 660, and approval of instructor.

ISYS 684 Professional Internship  
Credits 1 to 6.1 to 6 Other Hours.  
A directed internship in an organization to provide students with on-the-job training with professionals in organizational settings appropriate to the student's professional objectives. May be repeated for credit. Classification 6 students may not enroll in this course.  
Prerequisite: Approval of committee chair and department head.

ISYS 685 Directed Studies  
Credits 1 to 4.1 to 4 Other Hours.  
Directed study on selected problems using recent developments in business research methods. Classification 6 students may not enroll in this course.  
Prerequisite: Approval of instructor and graduate advisor.

ISYS 686 Theory and Research in Management Information Systems  
Credits 3.3 Lecture Hours.  
Theory, applications and human and organizational issues of Management Information Systems (MIS); current academic research into the analysis, design and implementation of computer information systems. Classification 6 students may not enroll in this course.  
Prerequisites: Doctoral classification and approval of instructor.

ISYS 689 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in identified area of information systems, operations management or management science. Classification 6 students may not enroll in this course. May be repeated for credit.

**ITAL - Italian**

**Courses**

ITAL 101 Beginning Italian I  
Credits 4.3 Lecture Hours. 2 Lab Hours.  
(ITAL 1411, 1511) Beginning Italian I. Elementary language study with oral, written and reading practice; preparation for conversation; part of class preparation will be done in language laboratory.

ITAL 102 Beginning Italian II  
Credits 4.3 Lecture Hours. 2 Lab Hours.  
(ITAL 1412, 1512) Beginning Italian II. Continuation of ITAL 101; part of class preparation will be done in the language laboratory.  
Prerequisite: ITAL 101.

ITAL 201 Intermediate Italian I  
Credits 3.3 Lecture Hours.  
(ITAL 2311) Intermediate Italian I. Readings of average difficulty; review of grammar; practice in conversation and composition.  
Prerequisite: ITAL 102.
ITAL 202 Intermediate Italian II  
Credits 3. 3 Lecture Hours.  
(ITAL 2312) Intermediate Italian II. Continuation of ITAL 201 with more advanced material.  
Prerequisite: ITAL 201.  
ITAL 285 Directed Studies  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Individual supervision of readings or assigned projects in Italian, selected for each student individually.  
Prerequisite: Approval of instructor and department head.  
ITAL 289 Special Topics In...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of Italian studies. May be repeated for credit.  
Prerequisite: Approval of instructor.  
ITAL 303 Composition and Conversation  
Credits 3. 3 Lecture Hours.  
Readings of contemporary Italian prose; intensive review of grammar and syntax; development of written and oral skills; expansion of vocabulary; translations, compositions and short presentation.  
Prerequisite: ITAL 202 or equivalent.  
ITAL 451/EURO 451 Introduction to Italian Culture  
Credits 3. 3 Lecture Hours.  
Introduction to the culture of the Italian Peninsula, from Middle Ages to present; study of major works of literature, political science, visual arts, music and cinema, to set Italy’s culture in its social and historical context; taught in English.  
Prerequisite: ITAL 201 or registration therein, or approval of instructor.  
Cross Listing: EURO 451/ITAL 451.  
ITAL 452/WGST 452 Women and Gender in Italian Literature  
Credits 3. 3 Lecture Hours.  
The historical and cultural dynamics forging the notion of woman and gender in Italian society and literature; discussion of films and theoretical texts concerning subjectivity and language, body and culture; taught in English.  
Prerequisite: ITAL 201 or registration therein or approval of instructor.  
Cross Listing: WGST 452/ITAL 452.  
ITAL 453/EURO 453 Italian Literature  
Credits 3. 3 Lecture Hours.  
Survey of Italian literature; focus on literary portrayal of reality in modern and contemporary Italian culture, the dialogue with the classical tradition, and literature's potential to affect and be affected by social critique; taught in English.  
Prerequisite: ITAL 201 or registration therein or approval of instructor.  
Cross Listing: EURO 453/ITAL 453.  
ITAL 454/EURO 454 Italian Drama  
Credits 3. 3 Lecture Hours.  
Study of Italian dramatic literature from the origins of Italian theater to the contemporary stage; analysis of the link between theater, opera, and film; taught in English.  
Prerequisite: ITAL 201 or registration therein or approval of instructor.  
Cross Listing: EURO 454/ITAL 454.  
ITAL 455/FILM 455 Italian Cinema  
Credits 3. 3 Lecture Hours.  
Survey of Italian cinema from Neorealism to the present; taught in English.  
Prerequisite: Junior or senior classification, or approval of instructor.  
Cross Listing: FILM 455/ITAL 455.  
ITAL 456/EURO 456 Contemporary Italy  
Credits 3. 3 Lecture Hours.  
Examination of changes in Italian society and culture since World War II, with focus on their narration and interpretation by representative authors and filmmakers, and on multicultural literary production in present-day Italy; taught in English.  
Prerequisite: ITAL 201 or registration therein or approval of instructor.  
Cross Listing: EURO 456/ITAL 456.  
ITAL 485 Directed Studies  
Credits 1 to 4. 1 to 4 Other Hours.  
Individual supervision of readings or assigned projects, selected for each student individually; written and oral reports.  
Prerequisite: Approval of instructor and department head.  
ITAL 692 Readings  
Credits 3. 3 Lecture Hours.  
Readings in Italian literary texts in the original language.  
Prerequisite: Graduate classification.  

JAPN - Japanese  

Courses  
JAPN 101 Beginning Japanese I  
Credits 4. 4 Lecture Hours. 2 Lab Hours.  
(JAPN 1411, 1511) Beginning Japanese I. Elementary language study with oral, written and reading practice; preparation for conversation; part of class preparation to be done in the language laboratory.  
JAPN 102 Beginning Japanese II  
Credits 4. 4 Lecture Hours. 2 Lab Hours.  
(JAPN 1412, 1511) Beginning Japanese II. Continuation of JAPN 101; part of class preparation to be done in the language laboratory.  
Prerequisite: JAPN 101.  
JAPN 110 Functional Japanese: History and Culture  
Credits 3. 3 Lecture Hours.  
Designed to complement beginning Japanese courses; emphasis on oral production and ability to function in a variety of real-life situations; includes survey of Japanese history.  
Prerequisite: Ability to read Hiragana and Katakana.  
JAPN 201 Intermediate Japanese I  
Credits 4. 4 Lecture Hours.  
(JAPN 2311) Intermediate Japanese I. Readings of average difficulty; review of grammar; practice in conversation and composition.  
Prerequisite: JAPN 102.  
JAPN 202 Intermediate Japanese II  
Credits 4. 4 Lecture Hours.  
(JAPN 2312) Intermediate Japanese II. Continuation of JAPN 201 with more advanced material.  
Prerequisite: JAPN 201.  
JAPN 285 Directed Studies  
Credits 1 to 4. 1 to 4 Other Hours.  
Individual supervision of readings or assigned projects in Japanese, selected for each student individually; written or oral reports.  
Prerequisite: Approval of instructor and Director of AALO.
JAPN 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of Japanese studies. May be repeated for credit.
Prerequisite: Approval of instructor.

JAPN 301 Upper Level Japanese I
Credits 3. 3 Lecture Hours.
Reading and listening practice using authentic and near-authentic materials; conversation practice in different levels of formality; composition and grammar; conducted in Japanese.
Prerequisite: JAPN 202.

JAPN 302 Upper Level Japanese II
Credits 3. 3 Lecture Hours.
Continuation of JAPN 301 with more advanced material.
Prerequisite: JAPN 301.

JAPN 401 Advanced Japanese I
Credits 3. 3 Lecture Hours.
Readings with selected grammar and kanji lessons; focus on Japanese traditional and popular culture, religion, and history; taught in Japanese.
Prerequisite: JAPN 302 or equivalent.

JAPN 402 Advanced Japanese II
Credits 3. 3 Lecture Hours.
Readings with selected grammar and kanji lessons; focus on Japanese private and business life, education, politics, and contemporary culture; taught in Japanese.
Prerequisite: JAPN 302 or equivalent.

JAPN 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Individual supervision of readings or assigned projects selected for each student individually; written or oral reports.
Prerequisite: Approval of instructor and Director of AALO.

JAPN 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of Japanese studies. May be repeated for credit.
Prerequisite: Approval of instructor.

JAPN 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research in Japanese studies conducted under the direction of faculty member approved by the Director of AALO. May be taken 2 times for credit.
Prerequisites: Junior or senior classification and approval of instructor.

JOUR 102 American Mass Media
Credits 3. 3 Lecture Hours.
(COMM 1307) American Mass Media. Introductory survey of mass communication media, their history and social role, to provide an understanding of the development and importance of mass communication media in modern society.
Prerequisite: Freshman or sophomore classification, or approval of program director.

JOUR 200 Mass Media Information
Credits 3. 3 Lecture Hours.
Strategies and procedures in identifying, gathering, analyzing and organizing information for the mass media; sources and methods; evaluation and validation of evidence; legal and ethical considerations.
Prerequisites: JOUR 102 with a grade of B or better, 80 percent on the GSP test or SAT or ACT equivalent, 2.5 GPR or higher, and freshman or sophomore classification; or approval of program director.

JOUR 203 Media Writing I
Credits 3. 2 Lecture Hours. 3 Lab Hours.
(Comm 2311) Media Writing I. Basic journalistic techniques common to all media; integration of news gathering, writing and editing; ethics. Limited to minors in journalism, or with approval of program director.
Prerequisites: JOUR 102 and JOUR 200, freshman or sophomore classification and enrollment in journalism minor; or approval of program director.*

JOUR 215/COMM 215 Interviewing: Principles and Practices
Credits 3. 3 Lecture Hours.
Theory and practice of methods in selected interview settings; emphasis on communication between two persons, questioning techniques, and the logical and psychological bases of interpersonal persuasion.

JOUR 230/COMM 230 Communication Technology Skills
Credits 3. 3 Lecture Hours.
Introduction to interactive media and media literacy skills in the digital domain; survey of technology histories, standards, and markets for industries such as multichannel TV, digital radio, video games, streaming media, epublishing, teleconferencing, and social networking.
Prerequisites: Communication or telecommunication media studies majors.
Cross Listing: COMM 230/JOUR 230.

JOUR 250/COMM 250 New Media and the Independent Voice
Credits 3. 3 Lecture Hours.
Examination of new media as independent voices for cultural and political movements; principles governing the design, presentation, and evaluation of blogs as a persuasive medium in society.
Cross Listing: COMM 250/JOUR 250.

JOUR 291 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the direction of a chosen faculty member in Journalism Studies. May be repeated for a maximum of 3 hours total credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

JOUR 301/COMM 307 Mass Communication, Law and Society
Credits 3. 3 Lecture Hours.
Mass media as social institutions; social responsibility and ethics of the press; history, constitutional development, and law of the First Amendment.
Prerequisites: JOUR 102 and JOUR 200, junior or senior classification and enrollment in journalism minor; or approval of program director.
Cross Listing: COMM 307/JOUR 301.*

JOUR 303 Media Writing II
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Interpretative news gathering and writing for various media; basic communication law and ethics; assigned practice on campus or other publications.
Prerequisites: JOUR 203, junior or senior classification and enrollment in journalism minor; or approval of program director.*
JOUR 304 Editing for the Mass Media
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Principles and practice of editing including: improving and tightening print and broadcast copy; writing headlines, titles and subheads; photo editing and cutlines; graphics and layout.
**Prerequisites:** JOUR 203, junior or senior classification and enrollment in journalism minor; or approval of program director.*

JOUR 365/COMM 365 International Communication
Credits 3. 3 Lecture Hours.
Mass media, international, and cross-cultural audiences, theoretical, pragmatic, political and ethical issues; including cultural differences, comparative media systems, development, communication, patterns of world news flow, political propaganda, impact of international advertising and other issues.
**Prerequisite:** Junior or senior classification.
**Cross Listing:** COMM 365/JOUR 365.

JOUR 450 Political Reporting
Credits 3. 3 Lecture Hours.
Interviewing; reporting; and writing various types of political stories and commentary; exploration of ethical principles and issues in political reporting including role of free press in a democracy.
**Prerequisite:** Junior or senior classification or approval of instructor.

JOUR 451 Arts & Entertainment Journalism
Credits 3. 3 Lecture Hours.
Arts & Entertainment Journalism. Journalistic coverage of arts and entertainment issues and events; examination of reviews and feature stories; feature writing and criticism; extensive workshop experience; emphasis on the value of research, self-editing and revision.
**Prerequisite:** Junior or senior classification or approval of instructor.

JOUR 455 Literary Nonfiction
Credits 3. 3 Lecture Hours.
Explores the art of writing literary nonfiction, a major trend in 21st century journalism; examines several forms of literary nonfiction, including personal essay, memoir, historical biography and modern narrative: to be written in each form; provides extensive workshop experience; emphasizes the value of critiques, self-editing and revision.
**Prerequisite:** Junior or senior classification or approval of instructor.

JOUR 458/COMM 458 Global Media
Credits 3. 3 Lecture Hours.
Study of globalization through media ownership; content, flow, cultural values, political power and technological impact; implications of globalization for local economies and audiences.
**Prerequisite:** Junior or senior classification or approval of instructor.
**Cross Listing:** COMM 458/JOUR 458.

JOUR 484 Internship
Credits 0 to 3. 0 to 3 Other Hours.
Directed internship in a private firm or public agency to provide on-the-job experience appropriate to the student's degree program and career objectives. To be taken on a satisfactory/unsatisfactory basis. Maximum of 3 credits may apply toward degree.
**Prerequisites:** Enrollment in journalism minor, completion of most other journalism courses and approval of instructor.*

JOUR 485 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Research problems related to communication field. Individual work, fitted to special needs of specific student as determined by his or her interests and aptitude.
**Prerequisites:** Enrollment restricted to students completing the journalism minor and approval of the program director.*

JOUR 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of journalism and mass communication. May be repeated for credit.
**Prerequisites:** Enrollment restricted to students completing the journalism minor and approval of the program director.*

JOUR 490 Journalism as a Profession
Credits 3. 3 Lecture Hours.
Exit-level course for interdisciplinary minor in Journalism; requires students to produce publication-quality projects; includes seminars in contemporary news media issues and practices.
**Prerequisites:** Enrollment in journalism minor, completion of most other journalism courses; or approval of the program director.*

JOUR 491 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the direction of a chosen faculty member in Journalism Studies. May be repeated for a maximum of 3 hours total credit.
**Prerequisites:** Junior or senior classification and approval of instructor.

**KINE - Kinesiology**

**Courses**

**KINE 120 The Science of Basic Health and Fitness**
Credit 1. 1 Lecture Hour. 1 Lab Hour.
Overview of the human body; scientific fundamentals of stress, fitness, nutrition, disease and drug use; interdisciplinary focus on wellness and longevity; integrated physical activity experiences centering on principles and applications of the scientific basis of conditioning; not open to students who have taken KINE 223.

**KINE 121 Physical and Motor Fitness Assessment**
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Assessment of individual physical fitness and motor ability profiles for students majoring in kinesiology.
**Prerequisite:** Kinesiology major.

**KINE 167 Visual and Performing Arts—Jazz Dance II**
Credit 1. 2 Lab Hours.
(DANC 1148) Visual and Performing Arts—Jazz Dance II. Intermediate study of jazz dance; review of historical background and cultural heritage; includes several jazz styles; proper body mechanics and alignment; placement exam required on the second day of class.
**Prerequisite:** Beginning jazz dance or approval of instructor.

**KINE 175 Gender Neutral Partnering**
Credit 1. 2 Lab Hours.
Explores the fundamental principles of partnering; explores the properties of momentum, weight sharing, contact improvisation, breath, timing and trust; develops movement phrases on the principles of impromptu and partnering.
**Prerequisite:** DCED 172 or approval of instructor.

**KINE 198 Health and Fitness Activity**
Credit 1. 2 Lab Hours.
(PHED 1164, 1238) Health and Fitness Activity. (0-2) Half lecture; half activity; student choice of designated fitness or strength related activities; lecture portion covers current health topics.
KINE 199 Required Physical Activity  
Credit 1. 2 Lab Hours.  
(Any 1-hour PHED activity course) Required Physical Activity. (0-2)  
Selection from a wide variety of activities designed to increase fitness and/or encourage the pursuit of lifetime activity.

KINE 201 Pilates Apparatus  
Credits 2. 2 Lecture Hours.  
Study of Pilates apparatus work as designed by Joseph H. Pilates; basic principles of Pilates including breathing, pelvic and ribcage placement, scapulae stabilization, head and cervical alignment; uses apparatuses such as reformer, cadillac, chair, and barrel; incorporates the use of props such as rollers, mini balls, physioballs, blocks, therabands and pinky balls into apparatus work. May be taken 2 times for credit.  
Prerequisites: KINE 198--Pilates Mat I; dance science track majors only or approval of instructor.

KINE 213 Foundations of Kinesiology  
Credits 3. 3 Lecture Hours.  

KINE 214/HLTH 214 Health and Physical Activity for Children  
Credits 3. 3 Lecture Hours.  
(PHED 1331) Health and Physical Activity for Children. Coordinated school health and physical activity programs appropriate for elementary aged children; focus on the content of the curriculum and the philosophical underpinnings of programming related to health and physical activity.  
Prerequisite: KINE 198.  
Cross Listing: HLTH 214/KINE 214.

KINE 215 Fundamentals of Coaching  
Credit 1. 1 Lecture Hour.  
(PHED 1321,1322) Fundamentals of Coaching. Study modern theories and applications related to coaching; philosophies, styles, techniques, team organization, liability and administration.  
Prerequisite: Kinesiology majors and coaching minors only.

KINE 223 Introduction to the Science of Health and Fitness  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Overview of the human body systems; interdisciplinary focus on wellness, fitness, nutrition, disease, drug use; integrated physical activity centering on principles and applications of conditioning; collect data, evaluate information, formulate plans based on findings; experience with pedometers, heart rate monitors, bioelectrical impedance devices, software and other technology. Not open to students who have taken KINE 120.

KINE 240/HLTH 240 Computer Technology in Health and Kinesiology  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Application of current technology in the areas of health and kinesiology; fundamentals of computers and their use; application of commercial software to health and kinesiology settings; use of computer networks for communications and research.  
Prerequisite: Freshman or sophomore classification in health or kinesiology.  
Cross Listing: HLTH 240/KINE 240.

KINE 260 Movement Lab: Ballet I  
Credits 2. 0 Lecture Hours. 5 Lab Hours.  
Understand body alignment through ballet technique; assess individual muscular and skeletal imbalances during a ballet technique class; video references of proper body alignment; anatomical explanation and assessment of individual's use of lateral rotation in ballet technique. May be taken 3 times for credit.  
Prerequisites: DCED 160; dance science majors, dance concentration majors and dance minors; or approval of instructor.

KINE 271 Movement Lab: Modern Dance I  
Credits 2. 0 Lecture Hours. 5 Lab Hours.  
Understand body alignment through modern dance; assess individual muscular and skeletal body imbalances during a modern dance class; introduction of how to work with imbalances in the body while executing proper dance technique; understand the structural and muscular alignment of parallel versus lateral rotation. May be taken 3 times for credit.  
Prerequisites: DCED 171; dance science majors, dance concentration majors and dance minors; or approval of instructor.

KINE 285 Directed Studies  
Credits 0 to 4. 0 to 4 Other Hours.  
Work on a specified topic with the intent of promoting independent reading, research and study; supplement existing course offerings or subjects nor presently covered.  
Prerequisites: Freshman or sophomore classification; approval of instructor.

KINE 289 Special Topics in...  
Credits 0 to 4. 0 to 4 Lecture Hours.  
Selected topics in an identified area of kinesiology. May be repeated for credit.

KINE 291 Research  
Credits 0 to 4. 0 to 4 Other Hours.  
Research conducted under the direction of faculty member in kinesiology. May be repeated 4 times for credit.  
Prerequisites: Freshman or sophomore classification and approval of instructor.

KINE 302 Applied Exercise Physiology for Coaches  
Credit 1. 1 Lecture Hour.  
Survey of the physiology of exercise with an emphasis on topics in applied physiology that coaches should understand in working with student athletes of both genders and different ages.  
Prerequisites: KINE 306; junior or senior classification or approval of instructor.

KINE 305 Sport Nutrition  
Credits 3. 3 Lecture Hours. 0 Lab Hours.  
Optimal nutritional intake in support of peak performance in sport and dance; food as fuel and which fuels are most important to specific sport/dance activities; the role nutritional supplements can play; fluid balance; weight management for athletes and dancers.  
Prerequisites: NUTR 202 or equivalent or approval of instructor; junior or senior classification.

KINE 306 Functional Anatomy for Coaches  
Credit 1. 2 Lab Hours.  
Introduction to musculoskeletal anatomy and movement analysis and the applications of these topics to basic sport skills.  
Prerequisite: Junior or senior classification or approval of instructor.
KINE 307 Lifespan Motor Development
Credits 3. 3 Lecture Hours.
Developmental characteristics and contemporary issues associated with motor behavior across the lifespan.
Prerequisite: Junior or senior classification or approval of instructor.

KINE 308 Integrated Adventure Education
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Philosophy of outdoor education in a physical education program; designing and implementing outdoor adventure activities in an experiential and interdisciplinary manner for reinforcing the Texas Essential Knowledge and Skills.
Prerequisites: Junior or senior classification or instructor approval.

KINE 311 Fundamental Rhythms and Dance
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Theory and practice in fundamental rhythms and dance as appropriate for elementary and secondary school curricula.
Prerequisite: Approval of instructor.

KINE 312 Coaching of Baseball
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Theory and practice of coaching fundamentals in baseball.
Prerequisite: KINE 215.

KINE 317 Coaching of Football
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Theory and practice of coaching fundamentals in football.
Prerequisite: KINE 215.

KINE 318 Athletic Injuries
Credits 3. 3 Lecture Hours.
Introduction to the profession of athletic training; comprehensive analysis of the theories and practices in preventing, recognizing and treating common athletic injuries.
Prerequisites: HLTH 216; BIOL 319; BIOL 320; junior or senior classification.

KINE 320 Advanced Athletic Injuries
Credits 3. 3 Lecture Hours.
Principles and procedures of therapeutic modalities, therapeutic exercise and rehabilitation as they relate to physical education, athletic training and physical therapy.
Prerequisites: KINE 318 and approval of instructor.

KINE 321 Coaching of Volleyball
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Coaching fundamentals in volleyball.
Prerequisites: KINE 215 and KINE 199-Volleyball or approval of instructor.

KINE 351 Coaching of Basketball
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Theory of fundamental skills needed to coach basketball with emphasis on knowledge of rules, strategies and skill analysis.
Prerequisites: KINE 215 and KINE 199-Basketball or approval of instructor.

KINE 355 Coaching of Track
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Theory and practice of coaching fundamentals in track and field events.
Prerequisite: KINE 215.

KINE 356 Advanced Coaching
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Self evaluation of correct body alignment and imbalances while executing proper ballet technique; observation and assessment of the student's progression throughout the semester in regards to proper alignment and technique. May be taken 3 times for credit.
Prerequisite: DCED 161; dance science majors, dance concentration majors and dance minors; or approval of instructor.

KINE 372 Movement Lab: Modern Dance II
Credits 2. 0 Lecture Hours. 5 Lab Hours.
Self evaluation of correct body alignment and imbalances while executing proper modern dance technique; observation and assessment of the student's progression throughout the semester in regards to proper alignment and technique. May be taken 3 times for credit.
Prerequisite: DCED 172; dance science majors, dance concentration majors and dance minors; or approval of instructor.

KINE 386 Sport Physiology
Credits 3. 3 Lecture Hours.
Scientific physiological principles as they relate to sport and exercise in the preparation of current and future coaches; emphasis on cognitive, physiological knowledge and practical applications necessary to earn a creditable national certification; safely and effectively train athletic, fitness and general populations.
Prerequisites: KINE 121, KINE 213 and KINE 302; junior or senior classification.

KINE 403 Dance Wellness
Credits 3. 3 Lecture Hours.
Using scientific methods to evaluate the dancer's body; implementation of dance screening process and creation of programs to address specific dance related injuries, imbalances or misalignments; study of current research in dance medicine/science and application of this knowledge to increase longevity of movement.
Prerequisites: BIOL 319, BIOL 320; dance science track majors only; admittance into the professional phase or approval of instructor; junior or senior classification.

KINE 404 Coaching Psychology
Credits 3. 3 Lecture Hours.
Mental aspects of coaching for performance improvement in athletic and exercise settings; focus on coaching applications of theoretical concepts including individual differences, motivation, team and group dynamics, leadership, performance enhancement, positive and negative health behaviors and youth development.
Prerequisite: Junior or senior classification, or approval of instructor.

KINE 406 Motor Learning and Skill Performance
Credits 3. 3 Lecture Hours.
Learning in psychomotor domain; motor learning theories, physiological bases of skill behavior, motor and skill learning, state of performer and application of instructional techniques in motor learning and skill performance.
Prerequisites: Junior or senior classification; admission to professional phase of program or approval of instructor for non-kinesiology majors.

KINE 425 Tests and Measurements
Credits 3. 3 Lecture Hours.
Comprehensive examination of the conceptual and theoretical aspects of measurement and evaluation in the field of kinesiology; emphasis on the application of statistical techniques germane to measurement and evaluation.
Prerequisites: Junior or senior classification; or approval of instructor for non-majors.
KINE 426 Exercise Biomechanics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
An integrated, mechanistic study of biomechanics of human motion during physical activity and exercise; biology and mechanical properties of the human movement system including bones, tendons, ligaments, cartilage, skeletal muscles, joints and whole body systems investigated.
Prerequisites: PHYS 201, BIOL 319, BIOL 320; junior or senior classification; admission to the professional phase of program or approval of instructor for non-majors.

KINE 427 Therapeutic Principles
Credits 3. 3 Lecture Hours.
Examination of human tissue types, characteristics, and physiology pertaining to injury, pain transmission, and the healing process; study of common therapeutic modalities such as ultrasound and electricity with emphasis on physiological mechanisms of effect.
Prerequisites: Junior or senior classification; admission to the professional phase of program or approval of instructor for non-kinesiology majors.

KINE 429 Adapted Physical Activity
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Kinesiology for individuals with handicapping conditions; emphasis on cognitive recognition of such handicaps as postural deviations, emotional disturbances, convulsive disorders, vision and auditory problems, and other learning disability conditions.
Prerequisite: Admission to professional phase of program or approval of instructor for non-majors.

KINE 431 Ropes Course and Group Process
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Techniques of group facilitation for initiatives of ropes/challenge course events; activity presentation and sequencing, safety techniques and construction principles, and processing experiences for transfer of learning.
Prerequisite: Junior or senior classification; approval of instructor.

KINE 433 Physiology of Exercise
Credits 3. 3 Lecture Hours.
Physiological bases of exercise and physical conditioning; measurement of metabolic efficiency during exercise, neuromuscular efficiency and body composition.
Prerequisites: BIOL 319, BIOL 320, junior or senior classification; admission to the professional phase of program or approval of instructor for non-majors.

KINE 434 Advanced Exercise Physiology
Credits 3. 3 Lecture Hours.
Investigates mechanisms responsible for skeletal muscle power production during exercise and the energetic support for the muscles through intermediary metabolism and oxygen flux from the lungs to the muscle mitochondria; examines the effects of training on these processes.
Prerequisites: KINE 433; junior or senior classification.

KINE 439 Exercise Evaluation and Prescription
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Prerequisites: KINE 433; senior classification; admission to the professional phase of program or approval of instructor for non-kinesiology majors.

KINE 462 Movement Lab: Ballet III
Credits 2. 0 Lecture Hours. 5 Lab Hours.
Peer evaluation of body alignment, imbalances and biomechanics of movement; explanation of kinesthetic principles and injury prevention through ballet technique; conditioning programs for a peer’s imbalances and improper technique in a ballet class. May be taken 3 times for credit.
Prerequisites: DCED 162; dance science majors, dance concentration majors and dance minors; or approval of instructor.

KINE 473 Movement Lab: Modern Dance III
Credits 2. 0 Lecture Hours. 5 Lab Hours.
Peer evaluation of body alignment, imbalances and biomechanics of movement; explanation of kinesthetic principles and injury prevention through modern dance technique; develop conditioning program for a peer’s imbalances and improper technique in a modern dance class. May be taken 3 times for credit.
Prerequisites: DCED 173; dance science majors, dance concentration majors and dance minors; or approval of instructor.

KINE 482 Seminar
Credit 1. 1 Lecture Hour.
Acquaint students with current research and the research process in their chosen field of study (kinesiology). May be taken four times for credit. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisites: Admission to professional phase of program or approval of instructor; junior or senior classification.

KINE 483 Practicum in Kinesiology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Participation and study in the areas of fitness assessment, exercise and/or sport programming, and fitness/sport administration; acquisition and practice of professional and/or clinical skills in kinesiology.
Prerequisites: KINE 199 (Aerobic Movement); senior classification; admission to the professional phase; approval of instructor.

KINE 484 Internship in Kinesiology
Credits 0 to 12. 0 to 12 Other Hours.
Supervised internship with corporate fitness centers, rehabilitation centers, hospitals, recreation centers and similar agencies and organizations.
Prerequisites: KINE 483; completion of all coursework.

KINE 485 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Special problems in kinesiology assigned to individual students or to groups.
Prerequisites: Junior or senior classification; approval of instructor.

KINE 489 Special Topics in...
Credits 0 to 4. 0 to 4 Lecture Hours.
Selected topics in an identified area of kinesiology. May be repeated for credit.

KINE 491 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in kinesiology. May be repeated 4 times for credit.
Prerequisites: Junior or senior classification and approval of instructor.

KINE 601 Reading Research Publications in Kinesiology
Credits 3. 3 Lecture Hours.
Instruction in, and development of, research skills through the study of published reports and readings in kinesiology.
KINE 606 Motor Neuroscience I  
Credits 3.3 Lecture Hours.  
Neurophysiology of the neuromuscular system with emphasis on motor control; topics include organization of the CNS; reflexes; integration of sensory information; experimental approaches to study neuromuscular control and neurophysiology of contemporary motor control theories.  
Prerequisite: KINE 406 or equivalent.

KINE 622 Supervision of Health and Kinesiology  
Credits 3.3 Lecture Hours.  
Principles and processes of supervision; in-service training of personnel.

KINE 623 Administration of Health and Kinesiology  
Credits 3.3 Lecture Hours.  
Administration of comprehensive programs of kinesiology in higher education settings.

KINE 624 Pedagogical Research in Teaching/Physical Education  
Credits 3.3 Lecture Hours.  
Examine pedagogical research in education and relate to the specialty area of physical education; study key research paradigms that now influence inquiry in physical education and link to current practices in effective teaching.

Prerequisites: Graduate classification and approval of instructor.

KINE 626 Exercise for Clinical Population  
Credits 3.3 Lecture Hours.  
Principles relevant to exercise programming for persons with chronic disease/disability; includes information for each condition: pathophysiology, effect on exercise response, effects of exercise on disease process, and recommendation for exercise testing and programming.

Prerequisite: KINE 433 or instructor approval.

KINE 628 Nutrition in Sport and Exercise  
Credits 3.3 Lecture Hours.  
Interaction between nutrition, exercise, and athletic performance; including: biochemical and physiological aspects of nutrition and exercise; nutrition for training and competition; exercise and oxidant stress; nutritional supplements and ergogenic acids; and nutritional aspects of body composition and weight control.

Prerequisite: Graduate classification; BIOL 320; KINE 433 or approval of instructor.

KINE 629 Physiology of Strength and Conditioning  
Credits 3.3 Lecture Hours.  
Physiological, bio-mechanical, and metabolic aspects of muscular strength and conditioning programs for various athletic and non-athletic populations; review of resistance training based on scientific literature; promote the use of a structured scientific approach in the prescription of progressive resistance training.

Prerequisite: Graduate classification; BIOL 320; KINE 433 or approval of instructor.

KINE 631 Specialized Strength and Conditioning Techniques  
Credits 3.3 Lecture Hours.  
Research based physiological responses and adaptations associated with power, speed, quickness, flexibility and mobility; laboratory demonstration/implementation and specific practical experiences based on available scientific research. Practical mastery as well as theoretical understanding required.

Prerequisite: KINE 629 or approval of instructor.

KINE 637 Exercise Physiology I  
Credits 3.3 Lecture Hours.  
Functional changes brought about by acute and chronic exercise; topics include muscle structure/function, energy transduction, biochemistry of exercise, muscle mechanics, fatigue and adaptation.

Prerequisite: KINE 433 or equivalent.

KINE 638 Exercise Physiology II  
Credits 3.3 Lecture Hours.  
Functional changes brought about by acute and chronic exercise; topics include pulmonary and cardiovascular physiology, training and detraining, and special topics.

Prerequisite: KINE 433 or equivalent.

KINE 639 Exercise Electrocardiography  
Credits 3.3 Lecture Hours.  
Electrocardiography (ECG) for the exercise scientist; emphasis on recognition and interpretation of normal and aberrant ECG patterns encountered during the graded exercise test; physiologic mechanisms underlying the normal and abnormal ECG.

Prerequisites: KINE 638 and 648 or approval of instructor.

KINE 640 Motor Neuroscience II  
Credits 3.3 Lecture Hours.  
Contemporary theories of motor learning that link behavioral analysis to underlying neural correlates of control; topics include memory; physical, mental and observational practice; internal models, motor planning-programming; and self-organization in perception-action systems; emphasis on cognitive and behavioral neuroscience.

Prerequisite: KINE 406 or equivalent.

KINE 641 Motor Neuroscience: Development Issues  
Credits 3.3 Lecture Hours.  
Explores the contemporary developmental issues associated with motor behavior (perception to action) across the lifespan; topics include physical and neurological growth, perception, motor control, and environmental influence.

Prerequisite: KINE 307 or equivalent.

KINE 642 Self-organization in Motor Neuroscience  
Credits 3.3 Lecture Hours.  
Application of the concepts of non-linear dynamical systems theory and self-organization to the study of biological motion and learning; topics include perception-action coupling, phrase transitions and stability, sensori-motor transformations.

Prerequisites: KINE 406 and KINE 641.

KINE 646 Fundamentals of Space Life Sciences  
Credits 3.3 Lecture Hours.  
Integrates nutrition, physiology, and radiation biology to define major biological problems in long duration space flight; provide an overview of the problems of bone loss, muscle wasting, and radiation-enhanced carcinogenesis along with potential countermeasures; focus on nutritional interventions and exercise protocols.

Cross Listing: NUTR 646 and NUEN 646.

KINE 647 Instrumentation and Techniques in Exercise Physiology I  
Credits 2.1 Lecture Hour. 3 Lab Hours.  
Theory, experiments and demonstrations in exercise physiology; laboratory experience in the use of metabolic and biochemical instrumentation commonly found in a modern exercise physiology laboratory.

Prerequisite: Concurrent enrollment in KINE 637.
KINE 648 Instrumentation and Techniques in Exercise Physiology II
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Theory, experiments and demonstrations in exercise physiology; laboratory experience in the use of metabolic and biochemical instrumentation commonly found in a modern exercise physiology laboratory. A continuation of KINE 647.
Prerequisite: KINE 637 or concurrent enrollment.

KINE 649 Applied Exercise Physiology
Credits 3. 3 Lecture Hours.
Investigate how the acute physiological responses to exercise and the chronic physiological adaptations to exercise training are altered by environmental factors--heat, cold, altitude, and microgravity, and by age and sex; addresses the physiological bases for reducing the risk of cardiovascular, metabolic and bone disease through physical activity.
Prerequisite: KINE 433 or equivalent.

KINE 681 Seminar
Credit 1. 1 Lecture Hour.
Reports and discussions of topics of current interest in kinesiology.

KINE 682 Seminar in...
Credit 1. 1 Other Hour.
Reports and discussions of topics of current interest in kinesiology. Students may register in up to but not more than four sections of this course in the same semester.

KINE 683 Practicum in Kinesiology
Credits 3. 3 Other Hours.
Observation and study of rehabilitation and kinesiology programs in schools and other institutions. May be repeated twice for credit.
Prerequisite: Approval of department head.

KINE 684 Professional Internship
Credits 1 to 6. 1 to 6 Other Hours.
Supervised experiences in application of formal training to performing professional functions consistent with career goals.
Prerequisites: 12 semester hours of selected graduate work; approval of department head.

KINE 685 Directed Studies
Credits 1 to 12. 1 to 12 Other Hours.
Directed study of selected problems in kinesiology not related to thesis. May be repeated for credit.
Prerequisite: Approval of department head.

KINE 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of kinesiology. May be repeated for credit.
Prerequisite: Approval of department head.

KINE 690/HLTH 690 Theory of Research in Discipline
Credits 3. 3 Lecture Hours.
Theory and design of research problems and experiments in various subfields of the discipline; communication of research proposals and results; evaluation of current research of faculty and students and review of current literature. May be repeated for credit.
Cross Listing: HLTH 690/KINE 690.

KINE 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research for thesis or dissertation.
Prerequisite: Approval of committee chair.

Courses

KNFB 222/HEFB 222 Teaching and Schooling in Modern Society
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Developing an understanding of students in multiple settings and levels; development, structure, history, finance, and management of schools in a democratic society; philosophical, ethical and moral dimensions of teaching; professional role of teacher.
Prerequisite: Majors only; junior or senior classification.
Cross Listing: HEBF 222/KNFB 222.

KNFB 315 Elementary School Physical Activities
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Physical activities, materials and curriculum in elementary schools.
Prerequisite: Junior or senior classification; admission to the professional phase of program.

KNFB 324 Technology and Teaching Skills for the 21st Century Learner
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Preparation of future Health and Physical Education teachers with practical skills related to: technology in the classroom/gymnasium, strategies for addressing urban education and English language learners, liability, management and classroom discipline, development of professional communication skills and time management; includes field based experiences in diverse classroom settings.
Prerequisites: KNFB 222/HEFB 222; junior or senior classification; admission to the professional phase of program.

KNFB 325/HEFB 325 Introduction to Secondary School Teaching
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Introduce fundamental teaching skills and theories necessary for preparing reflective teachers; examine classroom management, learning strategies and assessment techniques; classroom lectures combined with field-based experiences to link theory into practice.
Prerequisites: KNFB 324, admission to professional phase of program; junior or senior classification.
Cross Listing: HEFB 325/KNFB 325.

KNFB 416 Middle and Secondary School Physical Activities
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Physical activities, teaching strategies, media techniques and curriculum in middle and secondary schools.
Prerequisites: Admission to professional phase of program; approved acceptance to field experience.

KNFB 450 Supervised Student Teaching
Credits 6. 6 Other Hours.
Observation and participation in an accredited public school classroom; techniques of teaching student's teaching fields, and appropriate instructional strategies for assigned student population.
Prerequisites: Admission to professional phase of program and to student teaching.

LAND - Landscape Architecture
Courses

LAND 200/URPN 200 Introduction to Landscape Architectural Practice
Credit 1. 1 Lecture Hour.
Explores and evaluates the diversity of landscape architectural practice; defines the traditional practice forms and examines evolving and boundary expanding opportunities for future practice; introduces the departmental curriculum and faculty.
Cross Listing: URPN 200/LAND 200.*

LAND 240 History of Landscape Architecture
Credits 3. 3 Lecture Hours.
Introduction to history of land use, urban design and planning, and site design from prehistory to the present in Europe, Asia, Africa and Australia; contemporary issues in landscape architecture such as sustainability, ecological design, and professional roles, both historically and at present, with comparisons to American examples.
Prerequisite: Sophomore classification or higher.*

LAND 254 Landscape Architecture Communications I
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Introduction to basic drafting and drawing required for landscape architecture projects, introduction to basic concepts, principles of graphic composition and pencil sketching techniques.

LAND 255 Landscape Architectural Communications II
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Advanced study in traditional and computer-based communication techniques in landscape architecture including studio explorations in concept and analysis graphics, color sketching, perspective drawing and rendering, desktop publishing, image capturing and manipulation, and compilation of graphic presentations; lecture, demonstrations and studio assignments.
Prerequisite: LAND 254 or approval of instructor.*

LAND 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in landscape architecture. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

LAND 301 Landscape Architecture
Credits 3. 3 Lecture Hours.
Relevant theoretical discourse in landscape architecture, urban planning and urban design; urban theory, social and cultural theory; critical and creative thinking; ecological planning and design; design process and sustainable development; environmental philosophy and environmental aesthetics.
Prerequisite: Junior classification or approval of instructor.

LAND 318 Landscape Design I
Credits 4. 2 Lecture Hours. 7 Lab Hours.
Beginning studio course in land design; forces that produce useable three-dimensional site-space relationships; problems presented to give a basic knowledge, scope and application of landscape architecture design principles. Overnight field trip required.
Prerequisites: LAND 255; junior or senior classification or approval of instructor.

LAND 319 Landscape Design II
Credits 4. 2 Lecture Hours. 7 Lab Hours.
Continuation of LAND 318; basic design principles that combine natural systems (such as landform, water, vegetation, wildlife habitat, soils, climate) and human-built systems (such as roads, building utilities).
Prerequisites: LAND 318 and LAND 329.

LAND 320 Landscape Design III
Credits 5. 2 Lecture Hours. 9 Lab Hours.
Design process, synthesis and design refinement; problems to stimulate highly creative self-motivated results, design thinking to integrate behavioral settings into natural and/or built landscape systems.
Prerequisites: LAND 319 and LAND 330; junior or senior classification.*

LAND 321 Landscape Design IV
Credits 5. 2 Lecture Hours. 9 Lab Hours.
Continuation of LAND 320; land design projects of increased complexity with site scale problems used to demonstrate complete design thought. One or more field trips may be required as part of the course.
Prerequisite: LAND 320.*

LAND 329 Landscape Construction I
Credits 4. 2 Lecture Hours. 4 Lab Hours.
First construction studio course; aspects of site engineering and consideration of earth bound elements in land development; contours, landform, grading design, drainage principles, cut and fill computations, basic hydraulics and hydrology, stormwater management.
Prerequisite: Junior or senior classification or approval of instructor.

LAND 330 Landscape Construction II
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Second construction studio course; essential construction materials and systems applied in landscape development; topics include statics and mechanics of simple structures; properties and procedures of wood, masonry and concrete construction; construction sequencing and material costs; development of a construction document package required. Construction observation field trips required.
Prerequisites: LAND 318 and LAND 329; junior or senior classification.*

LAND 331 Landscape Construction III
Credits 4. 2 Lecture Hours. 4 Lab Hours.
Third construction studio course; sustainable water management techniques in landscape development; theory, principles and techniques of low impact development; construction document preparation, working drawings, project layout and design; theory and principles of irrigation and lighting design. Field trips required.
Prerequisites: LAND 320 and LAND 330; junior or senior classification.*

LAND 340 Development of Landscape Architecture in North America
Credits 3. 3 Lecture Hours.
Interaction between people and the land in North America from first settlement to the present; settlement patterns, sustainable land use, urban design and plan, and site design in context of cultural, social, and technological factors; current issues in landscape architecture, landscape urbanism, and land-use planning.
Prerequisite: Junior and senior classification or approval of instructor.

LAND 421 Landscape Design VI
Credits 5. 2 Lecture Hours. 9 Lab Hours.
Advanced study and research designed to take the student beyond the core design experience; introduction of issues, methodologies, tools and techniques developing in professional practice.
Prerequisite: LAND 321.*
LAND 442 Professional Practice
Credits 3. 3 Lecture Hours.
Procedures, management and ethical frameworks in which professional landscape architectural practice occurs; topics include forms of practice, employment, proposal preparation, fee and contract structures, project management, roles of the landscape architect, presentations and public participation, legal and ethical responsibilities.
Prerequisites: Senior classification; approval of instructor.*

LAND 484 Summer Internship
Credits 0. 0 Lecture Hours.
Practical experience in an office of design allied professionals; 10 week internship with a minimum of 400 hours; continuous employment; departmental pre-approval through the department internship coordinator required. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisites: Upper level classification and approval of internship coordinator; LAND 321.

LAND 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Special problems in various phases of landscape architecture assigned to individual students or to groups. Consultation and assigned collateral reading.
Prerequisite: Approval of department head.*

LAND 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified field of landscape architecture. May be repeated for credit.*

LAND 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in landscape architecture. May be repeated 2 times for credit.

LAND 494 Internship
Credits 6. 6 Lecture Hours.
An internship (15 week, 600 hours) with a landscape architecture or landscape architecture-related company that exposes the student to landscape architectural professional practice; monthly reports, final internship portfolio and internship supervisor assessment letter required; distance education course with non-resident status.
Prerequisites: Junior or senior classification and approval of instructor.

LAND 493 Directed Study
Credits 5. 2 Lecture Hours. 9 Lab Hours.
Special problems in various phases of landscape architecture assigned to individual students or to groups. Consultation and assigned collateral reading?
Prerequisite: Approval of department head.*

LAND 494 Internship
Credits 6. 6 Lecture Hours.
An internship (15 week, 600 hours) with a landscape architecture or landscape architecture-related company that exposes the student to landscape architectural professional practice; monthly reports, final internship portfolio and internship supervisor assessment letter required; distance education course with non-resident status.
Prerequisites: Junior or senior classification and approval of instructor.

LAND 601 Landscape Architectural Design Theory and Application I
Credits 5. 2 Lecture Hours. 9 Lab Hours.
First design studio course for career-change students; basic theories, principles, applications of landscape architectural design; design process; context-sensitive design; evidence based design; form-making skills; form-function-meaning relationships; spatial scale and dimensions; elements of natural and built environments; behavioral, psychosocial, policy and ecological factors in design; communication of design ideas.
Prerequisites: Graduate classification and approval of instructor.

LAND 602 Landscape Architectural Design Theory and Application II
Credits 5. 2 Lecture Hours. 9 Lab Hours.
Application of ecological concepts to site planning and site design, form and space making using natural features, and practical issues including social and political, technological and economic influences on ecological design.
Prerequisites: LAND 601.

LAND 603 Principle, Procedures and Techniques of Land Use
Credits 6. 2 Lecture Hours. 12 Lab Hours.
A continuation of LAND 601-602 sequence for career-change students; resolution of land problems that typically occur on a site; exploration of land use planning concepts and landscape ecology techniques; application of knowledge and skills acquired during the first year to a complex land development studio project.
Prerequisites: LAND 602 and approval of instructor.

LAND 612 Landscape Architectural Site Engineering and Development
Credits 4. 2 Lecture Hours. 6 Lab Hours.
First construction studio course; concepts, theories and techniques of site development; aspects of site engineering and consideration of earth bound elements in land development; contours, landform, grading design, drainage principles, cut and fill computations, basic hydraulics and hydrology, stormwater management, landscape construction materials.
Prerequisite: Approval of instructor.

LAND 613 Landscape Architectural Site Engineering and Development
Credits 4. 2 Lecture Hours. 6 Lab Hours.
Second construction studio course; sustainable water management techniques in landscape development; theory, principles and techniques of low impact development; basic elements of landscape architectural construction; construction document preparation, working drawings, project layout and design; theory and principles of irrigation and lighting design. Field trips required.
Prerequisite: LAND 612.

LAND 620 Open Space and Land Use Planning I
Credits 5. 2 Lecture Hours. 9 Lab Hours.
Creation of land use planning strategies for large land parcels; site inventory, analysis program formulation and design detailing sequenced into the production of a comprehensive master plan; consideration of issues in sustainability, environmental protection, growth management and resource utilization.
Prerequisite: LAND 601, LAND 602, LAND 603 or approval by instructor.

LAND 621 Open Space and Land Use Planning II
Credits 5. 2 Lecture Hours. 9 Lab Hours.
Projects with various scales; site selection, program formulation, theory, master planning and detailed design applied to topics of community design and development, and healthy communities; evidence based design methodology, techniques of professional design documentation and presentation.
Prerequisite: LAND 620 or approval by instructor.

LAND 630 Development of Landscape Architecture
Credits 3. 3 Lecture Hours.
Overview of the history of human settlement, land use and landscape architecture outside of North America.
Prerequisite: Graduate classification.

LAND 632/PLAN 632 Design for Active Living
Credits 3. 3 Lecture Hours.
(3-0). Understanding the forms and characteristics of the built environment and the influence on human behaviors, lifestyles and health; theoretical and empirical insights into the issues of physical activity, obesity, and automobile dependency; focus on how changes in the built environment help address these issues.
Prerequisite: Graduate classification or approval of instructor.
Cross Listing: PLAN 632/LAND 632.
LAND 635/PLAN 635 Concepts in Ecological Planning and Design
Credits 3. 3 Lecture Hours.
Reviews selected ecological concepts and explores integration into ecological/landscape planning, design using a historical perspective; historical and contemporary approach to provide and in-depth understanding of how they can better mediate between human actions and natural process.
Prerequisite(s): Graduate classification.
Cross Listing: PLAN 635/LAND 635.

LAND 640 Research Methods in Landscape Architecture
Credits 3. 3 Lecture Hours.
Research methods including theory, hypothesis formulation, design, data collection, measurement and report writing; equates research activity to landscape architecture and the interaction between people and their physical environment.
Prerequisite: LAND 603 or equivalent.

LAND 645 Practice Diversity in Landscape Architecture
Credits 3. 3 Lecture Hours.
An exploration of the diversity of practice opportunities within the profession of Landscape Architecture; individual roles within those areas of practice and the skills required to function successfully within them.
Prerequisites: Graduate classification and approval of instructor.

LAND 646 Professional Practice
Credits 3. 3 Lecture Hours.
Introduction to the procedures, management and ethical frameworks in which professional landscape architectural practice occurs; topics include forms of practice, employment issues, proposal preparation, fee and contract structures, project management, roles of the landscape architect, presentations and public participation, legal and ethical responsibilities.
Prerequisite: Graduate classification and approval of instructor.

LAND 655 Landscape Architectural Communication
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Graphic communication techniques required to expand landscape architectural concepts and designs including plan graphics, analysis and inventory graphics, perspective drawings, sketch composition, rendering media, color scanning, use of software and desktop.

LAND 661 Visual Quality for Design and Planning
Credits 3. 3 Lecture Hours.
Emphasis on social science perspectives for analyzing visual quality in built and natural landscapes, and effects of visual surroundings on human well-being and health; the content reflects a balance of theory, scientific research evidence and practical applications in areas of landscape architecture, architecture, urban planning and park design.
Prerequisite: Graduate classification.

LAND 681 Seminar
Credit 1. 1 Lecture Hour.
Analysis and criticism of selected landscape architectural projects. Lectures, reports and discussions.
Prerequisite: Graduate classification in landscape architecture.

LAND 684 Professional Internship
Credits 1 to 8. 1 to 8 Other Hours.
LAND 684 is sequenced for graduation; must be completed prior to the final year of advanced study in the summer; student is required to take a work position in an approved office for a minimum of ten weeks at forty hours/week.
Prerequisite: Approval of faculty.

LAND 685 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Advanced study in an individual landscape architecture course with a selected faculty member; focus on a topic mutually derived by the student and faculty member; requires the production of a professional response solution.
Prerequisite: Approval of faculty.

LAND 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of landscape architecture. May be repeated for credit.
Prerequisite: Approval of instructor.

LAND 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research for and preparation of dissertation.
Prerequisite: Doctoral classification.

LAND 693 Professional Study
Credits 1 to 23. 1 to 23 Other Hours.
Terminal studio to be taken by the qualified master of landscape architecture candidate; requires preparation of a proposal describing the topic, an outlined method, procedures and timeline to be submitted to committee; approved and completed study requires a defense and separate public presentation.
Prerequisite: Approval of a professional response solution.

LBAR - College of Liberal Arts

Courses

LBAR 181 First-Year Seminar in the Liberal Arts
Credits 1 to 3. 1 to 3 Lecture Hours.
First-year seminar on interdisciplinary topics of interest in the humanities and social sciences. May be taken on a satisfactory/unsatisfactory basis. May be repeated for credit.
Prerequisites: Freshman or sophomore classification; approval of the dean of liberal arts.

LBAR 200 Topics in Liberal Arts I
Credits 3. 3 Lecture Hours.
Introduction to the program, development of critical thinking skills and international perspectives; introductory course for the Liberal Arts Cornerstone Honors Learning Community.
Prerequisite: Admission to College of Liberal Arts Cornerstone Program Learning Community.

LBAR 203 Foundations of the Liberal Arts: Humanities
Credits 3. 3 Lecture Hours.
The intellectual roots and characteristic values and methods of liberal arts studies with emphasis on humanities disciplines.
Prerequisite: Approval of the dean of liberal arts.

LBAR 204 Foundations of the Liberal Arts: Social Sciences
Credits 3. 3 Lecture Hours.
The intellectual roots and characteristic values and methods of liberal arts studies with emphasis on social science disciplines.
Prerequisite: Approval of the dean of liberal arts.

LBAR 285 Directed Studies
Credits 0 to 3. 0 to 3 Other Hours.
Readings for specific needs of major or minor in departments in Liberal Arts.
LBAR 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of liberal arts. May be repeated for credit.
Prerequisite: Freshman or sophomore classification in liberal arts or approval of instructor.

LBAR 291 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the direction of a faculty member in Liberal Arts.
Prerequisites: 3 hours of 200-level courses in any department in the College of Liberal Arts; freshman or sophomore classification and approval of instructor.

LBAR 300 Liberal Arts Study Abroad
Credits 1 to 18. 1 to 18 Other Hours.
For students in approved programs abroad. May be repeated for credit.
Prerequisites: Admission to approved program; approval of study abroad coordinator and academic dean.

LBAR 330 Introduction to International Study
Credits 1 to 3. 1 to 3 Lecture Hours.
Readings and research preparatory to participation in a summer or semester at an international site.
Prerequisite: Approval of the dean of liberal arts.

LBAR 331 Studies in European Civilization and Culture I
Credits 1 to 6. 1 to 6 Lecture Hours.
European civilization and culture as seen especially through literature, history, philosophy and the arts. To be taught only at an overseas site.
Prerequisite: LBAR 330 or approval of instructor.

LBAR 332 Studies in European Civilization and Culture II
Credits 1 to 6. 1 to 6 Lecture Hours.
European civilization and culture as seen especially through political, social and economic developments. To be taught only at an overseas site.
Prerequisite: LBAR 330 or approval of instructor.

LBAR 392 Cooperative Education: Liberal Arts
Credit 1. 1 Other Hour.
Educational work assignment for a student in a career-related field; supervision by the employer, co-op coordinator and course instructor; technical report approved by the course instructor required. To be taken on a satisfactory/unsatisfactory basis.
Prerequisite: Approval of college co-op coordinator.

LBAR 400 Topics in Liberal Arts II
Credits 3. 3 Lecture Hours.
Emphasis on developed critical thinking, international perspectives and scholarly research; capstone course in the Liberal Arts Cornerstone Program Honors Learning Community. May be taken 3 times for credit as topics will vary each semester.
Prerequisites: LBAR 200 and admission to College of Liberal Arts Cornerstone Learning Program Community.

LBAR 484 Internship
Credits 0 to 12. 0 to 12 Other Hours.
Directed internship in a private firm, government or non-profit agency; provides experiential learning appropriate to the student's major and career objectives. Must be taken on a satisfactory/unsatisfactory basis. May be repeated for credit.
Prerequisites: Junior or senior classification and approval of major advisor.

LBAR 485 Directed Studies
Credits 0 to 3. 0 to 3 Lecture Hours. 0 to 3 Other Hours.
Readings for specific needs of major or minor in departments in Liberal Arts.

LBAR 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of liberal arts. May be repeated for credit.

LBAR 491 Research
Credits 1 to 3. 1 to 3 Other Hours.
Research conducted under the direction of a faculty member in Liberal Arts. May be repeated 2 times for credit.
Prerequisites: 12 credits in courses in departments in the College of Liberal Arts, including 3 at 300-level; junior or senior classification and approval of instructor.

LBAR 600 Liberal Arts Study Abroad
Credits 1 to 9. 1 to 9 Lecture Hours.
For students in approved programs to study abroad.
Prerequisites: Graduate classification; approval of department head.

LBAR 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of liberal arts. May be repeated for credit.

LBAR 698 Writing for Publication
Credits 3. 3 Lecture Hours.
Writing in academic disciplines and settings. Writing for different audiences and purposes. Style; planning and development of journal articles; grant proposals; correspondence; oral presentations; technical reports. Permission of departmental/college graduate advisor.
Prerequisite: Advanced standing in master's/doctoral programs.

LDEV - Land Development

Courses

LDEV 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Individual instruction in selected aspects of land development not adequately covered by other courses with stress on reports and readings in selected areas of land development.
Prerequisite: Junior classification or approval of instructor.

LDEV 489 Special Topics in...
Credits 1 to 6. 1 to 6 Lecture Hours.
Selected topics in an identified area of land and real estate development. May be repeated for credit.
Prerequisite: Junior classification or approval of instructor.

LDEV 661 Development and the Environment
Credits 3. 3 Lecture Hours.
Land development in the context of environment sustainability, human well being and business profitability to foster a restorative economy; environmental easement and site analysis; state, federal and international regulatory issues; and human ecology and the future of land development.
Prerequisite: Graduate classification.

LDEV 663 Introduction to Project Management
Credits 3. 3 Lecture Hours.
Project management processes for planning, scheduling, cost estimating resource leveling, cost control and post-completion evaluation; issues in project organizational environments, documentation, quality control safety.
Prerequisite: Graduate classification.
LDEV 644 Market Analysis for Development
Credits 3. 3 Lecture Hours.
Techniques and data sources for market analysis for development; analysis for housing development; trade area analysis and market analysis for retail development; analysis for office, industrial parks and for specialized development.
Prerequisite: Graduate classification.

LDEV 665 Land Development Trends
Credits 3. 3 Lecture Hours.
Exploration of a variety of specialized topics associated with emerging trends in the land development industry.
Prerequisite: Graduate classification.

LDEV 667 Design and Development Economy
Credits 3. 3 Lecture Hours.
Interface between the physical and financial dimensions in the design and development process to achieve building and project economics; creating a physical product and a financial venture that responds to social and environmental concerns and to market economy and feasibility analysis.
Prerequisite: Graduate classification.

LDEV 668 Land Development Practice
Credits 3. 3 Lecture Hours.
Strategies, methods and techniques of land development including: site selection criteria, urban infrastructure; market evaluation; conceptual arrangement of land uses and structures; conceptual design and regulatory considerations; lending institutions; location theory; value theories; regulatory agencies.
Prerequisite: LDEV 667.

LDEV 669 Income Property Land Development
Credits 3. 3 Lecture Hours.
Exploration of the characteristics of real estate as an investment, venture and capital structures, the development process, site and financial feasibility, and project funding; strategies, methods and technologies for investment property development utilizing current developments.
Prerequisite: Graduate classification.

LDEV 671 Sustainable Development
Credits 3. 3 Lecture Hours.
Sustainability perspectives about values, rights, property and what constitutes an optimum human environment; sustainability principles and case studies emphasizing on-the ground, incentive-based land development that balances economic growth with environmental quality.
Prerequisite: Graduate classification.

LDEV 672 Public-Private Project Funding
Credits 3. 3 Lecture Hours.
Financing and related issues in public-private development projects; explores structuring, valuing and managing projects and investigates the interaction between suppliers, operators, lenders and contractors; introduction to financial tools: loans, credit, interest rates and financial models.

LDEV 673 International Development Planning
Credits 3. 3 Lecture Hours.
International variations in urban growth and land development strategies: savings, aid and trade policy options for cities and regions; international co-development programs; application of planning and urban land development professions in contemporary global context.
Prerequisite: Graduate classification.

LDEV 681 Seminar
Credit 1. 1 Lecture Hour.
College of Architecture research activities pertaining to land and real estate development; preparation and presentation of required final paper for MS in Land Development examination.
Prerequisite: Graduate classification in land development.

LDEV 684 Professional Internship
Credits 1 to 12. 1 to 12 Other Hours.
Professional practice under approved arrangement with public or private land or real estate development agencies in the United States or abroad.
Prerequisites: Approval of committee chair and program coordinator.

LDEV 685 Directed Studies
Credits 1 to 12. 1 to 12 Other Hours.
Individual and group problems dealing with application of strategic plan development theory in practice: opportunities to select international or domestic development projects of special interest.
Prerequisite: Approval of instructor.

LDEV 687 Development Feasibility and Design
Credits 3. 1 Lecture Hour. 6 Lab Hours.
Selected residential and non-residential development projects of varying size analyzed by teams with respect to the following: economic feasibility and cash flow; site analysis; and design concept.
Prerequisite: Approval of instructor.

LDEV 688 Development Feasibility and Design II
Credits 3. 1 Lecture Hour. 6 Lab Hours.
Plans and venture structures for selected residential and non-residential development projects of varying size analyzed by multidisciplinary teams with respect to the following: economic feasibility and cash flow and site and design plans and costs.
Prerequisite: LDEV 687 or approval of instructor.

LDEV 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of land development. May be repeated for credit.
Prerequisite: Approval of instructor.

LDEV 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
PhD research and preparation of dissertation.
Prerequisite: Doctoral classification.

LDEV 693 Professional Study
Credits 1 to 6. 1 to 6 Other Hours.
Approved professional case study of project organization in the USA or abroad undertaken as terminal requirement for the Master of Science in land development degree, non-thesis option.
Prerequisites: Approval of committee chair and associate department head.

LING -Linguistics

Courses

LING 209/ENGL 209 Introduction to Linguistics
Credits 3. 3 Lecture Hours.
Nature of human language and of linguistics; includes an introduction to phonology, syntax, semantics and morphology and the role of spoken and written discourse in sustaining societal arrangements.
Cross Listing: ENGL 209/LING 209.
LING 291 Research
Credits 1 to 3. 1 to 3 Other Hours.
Research conducted under the direction of faculty member in linguistics.
Prerequisites: LING 209/ENGL 209; freshman or sophomore classification and approval of instructor.

LING 307 Language and Culture
Credits 3. 3 Lecture Hours.
Language and its correlations with other aspects of culture; nature and definition of language; non-technical overview of linguistic science and language as it is related to other behavior.
Prerequisite: LING 209/ENGL 209 or ENGL 209/LING 209.

LING 310/ENGL 310 History of the English Language
Credits 3. 3 Lecture Hours.
Phonological, grammatical and lexical history of the English language; brief discussion of some other Indo-European languages; principles of linguistic change, as reflected in English.
Prerequisite: LING 209/ENGL 209 or ENGL 209/LING 209.

LING 310/ENGL 310 History of the English Language
Credits 3. 3 Lecture Hours.
Phonological, grammatical and lexical history of the English language; brief discussion of some other Indo-European languages; principles of linguistic change, as reflected in English.
Prerequisite: LING 209/ENGL 209 or ENGL 209/LING 209.

LING 403 Language and Gender
Credits 3. 3 Lecture Hours.
Language and gender from a sociolinguistic perspective; gender in the words and structures of language; gender representation and gendered language use in the media; and a variety of sociocultural contexts; language use in intimate relationships; computer-mediated discourse; language, sexuality, and sexual orientation.
Prerequisite: Junior or senior classification.
Cross Listing: ENGL 403 and WGST 403.

LING 481 Senior Seminar
Credits 3. 3 Lecture Hours.
Seminar on significant figures, movements and issues in linguistics or rhetoric, with special attention to the methods and materials of scholarship.
Prerequisites: Junior or senior classification; 6 credits in linguistics.

LING 485 Directed Studies
Credits 1 to 3. 1 to 3 Other Hours.
Directed individual study of topics in linguistics. May be repeated for credit.

LING 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of linguistics. May be repeated for credit.

LING 491 Research
Credits 1 to 3. 1 to 3 Other Hours.
Research conducted under the direction of faculty member in linguistics. May be repeated 2 times for credit.
Prerequisites: 6 credits of linguistics; junior or senior classification and approval of instructor.

LING 602 Topics in Sociolinguistics
Credits 3. 3 Lecture Hours.
Topics in the study of language and society; may focus on language use and change; how social variable affect language use and change; different theoretical approaches; issues and controversies. May be taken three times for credit as content varies.

LING 610/ENGL 610 Topics in the History of the English Language
Credits 3. 3 Lecture Hours.
Topics in the development of the English language; may include phonological, grammatical and lexical histories; study of social and political contexts; relationships between English and other languages.
Cross Listing: ENGL 610/LING 610. May be taken three times for credit as content varies.

LING 670 Topics in Discourse Analysis
Credits 3. 3 Lecture Hours.
Topics in linguistic and discourse analysis; possible topics include discourse and identity, language and gender, register studies, ethnography of communication, linguistics and literature. May be taken three times for credit as content varies.

LING 685 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Readings to supplement the student's knowledge of English language and linguistics in areas not studied in other courses.
Prerequisites: Graduate classification and approval of department head.

MASC - Integrated Math & Sci

Courses

MASC 351 Problem Solving in Mathematics
Credits 3. 3 Lecture Hours.
Problem solving strategies in math and science; evaluate conjectures and arguments; writing and collaborating on problem solutions; posing problems and conjectures; constructing knowledge from data; developing relationships from empirical evidence; connecting mathematics concepts; readings, discussions, and analyses will model and illustrate mathematics problems solving and proofs.
Prerequisites: 6 hours of mathematics.

MASC 371 Inquiries in Life and Earth Sciences
Credits 3. 3 Lecture Hours.
Integration and connections among topics in the life and earth sciences--diversity, natural selection, ecosystem development, earth's features, and weather systems; inquiry emphasizing experimental design, data analysis and collection; use of models in the life and earth sciences.
Prerequisites: BIOL 111 or BIOL 113 and BIOL 123, CHEM 106 and CHEM 116, GEOL 101 or GEOG 203, ASTR 101 and ASTR 102, and PHYS 205; junior or senior classification; admission to teacher certification.

MASC 450 Integrated Mathematics
Credits 3. 3 Lecture Hours.
Integration and connections among topics and ideas in mathematics and other disciplines; connections between algebra and geometry and statistics and probability; focus for integration with authentic problems requiring various branches of mathematics.
Prerequisites: MASC 351; admission to teacher education; junior classification.

MASC 475 Inquiries in Physical Science
Credits 3. 3 Lecture Hours.
Integration and connections among topics in physical sciences--matter, energy, force, motion, scientific cycles; focuses on inquiry emphasizing experimental design, data analysis and collection, and use of models in the physical sciences.
Prerequisites: BIOL 111, BIOL 113 and BIOL 123, CHEM 106 and CHEM 116, GEOL 101 or GEOG 203, ASTR 101 and ASTR 102, and PHYS 205; junior or senior classification; admission to teacher certification.

MATH - Mathematics
Courses

MATH 102 Algebra
Credits 3. 3 Lecture Hours.
(MATH 1314, 1414) Algebra. Sets, structure of number system; absolute values, solution sets of linear and nonlinear equations, of systems of equations, and of inequalities; relations and functions, graphical representations, graphical representations, progressions, mathematical induction, determinants.

MATH 131 Mathematical Concepts—Calculus
Credits 3. 3 Lecture Hours.
Mathematical Concepts—Calculus. Limits and continuity; rates of change, slope; differentiation: the derivative, maxima and minima; integration: the definite and indefinite integral techniques; curve fitting. No credit will be given for more than one of MATH 131, MATH 142, MATH 147, MATH 151 and MATH 171.
Prerequisites: High school algebra I and II and geometry.

MATH 141 Business Mathematics I
Credits 3. 3 Lecture Hours.
Linear and quadratic equations and applications; functions and graphs, systems of linear equations, matrix algebra and applications, linear programming, probability and applications, statistics. No credit will be given for more than one of MATH 141 and MATH 166.
Prerequisites: High school algebra I and II and geometry.

MATH 142 Business Mathematics II
Credits 3. 3 Lecture Hours.
(MATH 1325) Business Mathematics II. Derivatives, curve sketching and optimization, techniques of derivatives, logarithms and exponential functions with applications, integrals, techniques and applications of integrals, multivariate calculus. No credit will be given for more than one of MATH 131, MATH 142, MATH 147, MATH 151 and MATH 171.
Prerequisites: High school algebra I and II and geometry or satisfactory performance on a qualifying examination.

MATH 147 Calculus I for Biological Sciences
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Introduction to differential calculus in a context that emphasizes applications in the biological sciences. No credit will be given for more than one of MATH 131, MATH 142, MATH 147, MATH 151 and MATH 171.
Prerequisite: MATH 150 or equivalent or acceptable score on TAMU Math Placement Exam.

MATH 148 Calculus II for Biological Sciences
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Introduction to integral calculus in a context that emphasizes applications in the biological sciences; ordinary differential equations and analytical geometry. No credit will be given for more than one of MATH 148, MATH 152 and MATH 172.
Prerequisite: MATH 147 or approval of instructor.

MATH 150 Functions, Trigonometry and Linear Systems
Credits 4. 3 Lecture Hours. 2 Lab Hours.
(MATH 2412) Functions, Trigonometry and Linear Systems. Graphs, functions, college algebra and trigonometry, linear systems and vectors.

MATH 151 Engineering Mathematics I
Credits 4. 3 Lecture Hours. 2 Lab Hours.
(MATH 2413, 2513) Engineering Mathematics I. Rectangular coordinates, vectors, analytic geometry, functions, limits, derivatives of functions, applications, integration, computer algebra. MATH 171 designed to be a more demanding version of this course. No credit will be given for more than one of MATH 131, MATH 142, MATH 147, MATH 151 and MATH 171.
Prerequisite: MATH 150 or equivalent or acceptable score on TAMU Math Placement Exam.

MATH 152 Engineering Mathematics II
Credits 4. 3 Lecture Hours. 2 Lab Hours.
(MATH 2414) Engineering Mathematics II. Differentiation and integration techniques and their applications (area, volumes, work), improper integrals, approximate integration, analytic geometry, vectors, infinite series, power series, Taylor series, computer algebra. MATH 172 designed to be a more demanding version of this course. No credit will be given for more than one of MATH 148, MATH 152 and MATH 172.
Prerequisite: MATH 151 or equivalent.

MATH 166 Topics in Contemporary Mathematics II
Credits 3. 3 Lecture Hours.
Finite mathematics, matrices, probability and applications. No credit will be given for more than one of MATH 141 and MATH 166.
Prerequisites: High school algebra I and II and geometry.

MATH 167 For All Practical Purposes
Credits 3. 3 Lecture Hours.
Application of mathematics to real world situations using quantitative methods; includes urban services and elements of management science (optimal routes, planning and scheduling), elements of statistics (sampling/polling methods, analyzing data to make decisions), codes used by stores, credit cards, internet security, cryptography.
Prerequisite: High school algebra I and II.

MATH 170 Freshman Mathematics Laboratory
Credit 1. 2 Lab Hours.
Computing and problem solving laboratory; introduction to the various mathematical disciplines; development of skills in mathematical problem solving and skills in teamwork. May be taken two times for credit.
Prerequisites: Concurrent enrollment in MATH 171 or MATH 172; admission to College of Science.

MATH 171 Analytic Geometry and Calculus
Credits 4. 4 Lecture Hours.
Vectors, functions, limits, derivatives, Mean Value Theorem, applications of derivatives, integrals, Fundamental Theorem of Calculus. Designed to be more demanding than MATH 151. No credit will be given for more than one of MATH 131, MATH 142, MATH 147, MATH 151 and MATH 171.
Prerequisite: MATH 150 or equivalent or acceptable score on TAMU Math Placement Exam.

MATH 172 Calculus
Credits 4. 4 Lecture Hours.
Techniques of integration, applications of integrals, improper integrals, sequences, infinite series, vector algebra and solid analytic geometry. Designed to be more demanding than MATH 152. No credit will be given for more than one of MATH 148, MATH 152 and MATH 172.
Prerequisite: MATH 147, MATH 151 or MATH 171 or equivalent with a grade of C or better.
MATH 220 Foundations of Mathematics  
Credits 3. 3 Lecture Hours.  
Foundations of mathematics including logic, set theory, combinatorics, and number theory.  
**Prerequisite:** MATH 148, MATH 152 or MATH 172 or equivalent with a grade of C or better.

MATH 221 Several Variable Calculus  
Credits 4. 4 Lecture Hours.  
Vector algebra and solid analytic geometry; calculus of functions of several variables; Lagrange multipliers; multiple integration, theory, methods and application; line and surface integrals, Green’s and Stokes’ theorems; Jacobians. Designed to be more demanding than MATH 251 and MATH 253. No credit will be given for more than one of MATH 221, MATH 251 and MATH 253.  
**Prerequisite:** MATH 148, MATH 152, or MATH 172.

MATH 225 Advanced Spreadsheet Techniques  
Credit 1. 1 Lecture Hour.  
Advanced commands, formatting and functionality of spreadsheets, with Excel being the particular example.  
**Prerequisite:** MATH or APMS major.

MATH 251 Engineering Mathematics III  
Credits 3. 3 Lecture Hours.  
(MATH 2316) Engineering Mathematics III. Vector algebra, calculus of functions of several variables, partial derivatives, directional derivatives, gradient, multiple integration, line and surface integrals, Green’s and Stokes’ theorems. MATH 221 designed to be a more demanding version of this course. No credit will be given for more than one of MATH 221, MATH 251 and MATH 253.  
**Prerequisite:** MATH 148, MATH 152, or MATH 172.

MATH 253 Engineering Mathematics III  
Credits 4. 3 Lecture Hours.  
(MATH 2415) Engineering Mathematics III. Vector algebra; calculus of functions of several variables, partial derivatives, directional derivatives, gradient, multiple integration, line and surface integrals, Green’s and Stokes’ theorems, computer algebra. MATH 221 designed to be a more demanding version of this course. No credit will be given for more than one of MATH 221, MATH 251 and MATH 253.  
**Prerequisite:** MATH 148, MATH 152, or MATH 172.

MATH 281 Seminar in Mathematics  
Credit 1. 1 Lecture Hour.  
Designed to familiarize students with mathematics pertaining to real world applications in such areas as biology, signal processing, quantum computation and robotics. May be taken four times for credit.

MATH 285 Directed Studies  
Credits 1 to 4. 1 to 4 Other Hours.  
Special problems not covered by any other lower-division course in the curriculum; intended for freshman and sophomore students.  
**Prerequisite:** Approval of department head.

MATH 289 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of mathematics. May be repeated for credit.  
**Prerequisite:** Approval of instructor.

MATH 291 Research  
Credits 0 to 4. 0 to 4 Other Hours.  
Research conducted under the direction of faculty member in mathematics. May be repeated 2 times for credit.  
**Prerequisites:** Freshman or sophomore classification and approval of instructor.

MATH 302 Discrete Mathematics  
Credits 3. 3 Lecture Hours.  
Formal structures for describing data, algorithms and computing devices; theory and applications of sets, graphs and algebraic structures.  
**Prerequisite:** MATH 148, MATH 152, or MATH 172.

MATH 304 Linear Algebra  
Credits 3. 3 Lecture Hours.  
Introductory course in linear algebra covering abstract ideas of vector space and linear transformation as well as models and applications of these concepts, such as systems of linear equations, matrices and determinants. MATH 323 designed to be a more demanding version of this course. No credit will be given for more than one of MATH 304, MATH 309, MATH 311 and MATH 323.  
**Prerequisite:** MATH 148, MATH 152, or MATH 172; junior or senior classification.

MATH 308 Differential Equations  
Credits 3. 3 Lecture Hours.  
**Prerequisites:** MATH 221, MATH 251, or MATH 253, or concurrent enrollment; knowledge of computer algebra system.

MATH 309 Linear Algebra for Differential Equations  
Credits 3. 3 Lecture Hours.  
Systems of linear equations, matrices, determinants, vector spaces, linear transformations, eigenvalues and eigenvectors, diagonalization, inner product spaces, orthogonal functions, separation of variables, Fourier series, Bessel functions. No credit will be given for more than one of MATH 304, MATH 309, MATH 311 and MATH 323.  
**Prerequisites:** MATH 221, MATH 251, or MATH 253; MATH 308 or concurrent enrollment; junior or senior classification or approval of instructor.

MATH 311 Topics in Applied Mathematics I  
Credits 3. 3 Lecture Hours.  
Systems of linear equations, matrices, determinants, vector spaces, linear transformations, eigenvalues and eigenvectors, diagonalization, inner product spaces, orthogonal functions; vector analysis, including gradient, divergence, curl, line and surface integrals, Gauss’, Green’s and Stokes’ theorems. No credit will be given for more than one of MATH 304, MATH 309, MATH 311 and MATH 323.  
**Prerequisites:** MATH 221, MATH 251, or MATH 253; MATH 308 or concurrent enrollment; junior or senior classification or approval of instructor.

MATH 323 Linear Algebra  
Credits 3. 3 Lecture Hours.  
Linear equations and matrices; real vector spaces, linear transformations, change of bases, determinants, eigenvalues and eigenvectors, diagonalization, inner products. Designed to include more theory and be more demanding than MATH 304. No credit will be given for more than one of MATH 304, MATH 309, MATH 311 and MATH 323.  
**Prerequisites:** MATH 148, MATH 152 or MATH 172; MATH 220; junior or senior classification or approval of instructor.
MATH 325 The Mathematics of Interest
Credits 3. 3 Lecture Hours.
The mathematical theory associated with interest; annuities; internal rate of return; coupon bonds; valuation of noncallable bonds; yield of maturity; interest rate sensitivity; duration and convexity; reinvestment risk; total return; compound return; STRIPS; yield curve; short selling; hedge ratio; bond swaps.
Prerequisites: MATH 142, MATH 147, MATH 151 or MATH 171; junior classification.

MATH 365 Structure of Mathematics I
Credits 3. 3 Lecture Hours.
Informal logic, sets, relations, functions, whole numbers, numeration systems, binary operations, integers, elementary number theory, modular systems, rational numbers and the system of real numbers. Designed primarily for elementary teacher certification. Others must have consent of instructor.
Prerequisites: Must have completed University Core Curriculum mathematics requirements with a grade of C or better.

MATH 366 Structure of Mathematics II
Credits 3. 3 Lecture Hours.
Geometry, measurement and coordinate geometry. Designed primarily for elementary teacher certification. Others must have consent of instructor.
Prerequisite: MATH 365 or equivalent with a grade of C or better.

MATH 367 Basic Concepts of Geometry
Credits 3. 3 Lecture Hours.
Formal development of geometry: finite [Euclidean and non-Euclidean]. Designed primarily for elementary mathematics teacher certification. Others must have consent of instructor.
Prerequisite: MATH 366 or equivalent with a grade of C or better.

MATH 368 Introduction to Abstract Mathematical Structures
Credits 3. 3 Lecture Hours.
Mathematical proofs, sets, relations, functions, infinite cardinal numbers, algebraic structures, structure of the real line; designed primarily for elementary teacher certification.
Prerequisite: MATH 366 or equivalent with a grade of C or better.

MATH 375 Intermediate Real Analysis
Credits 3. 3 Lecture Hours.
Development of the real numbers, limits, foundations and major theorems of calculus. Designed primarily for mathematics teacher certification. Others must have consent of instructor.
Prerequisite: MATH 220 or equivalent.

MATH 376 Intermediate Abstract Algebra
Credits 3. 3 Lecture Hours.
Relations, functions, binary operators, rings, homomorphisms, integral domains and fields. Designed primarily for mathematics teacher certification. Others must have consent of instructor.
Prerequisites: MATH 220 or MATH 302; MATH 304 or equivalent.

MATH 396 Communications in Mathematics
Credit 1. 1 Lecture Hour.
Electronic, written, and oral communications in mathematics.
Prerequisites: MATH 220, junior or senior classification, and mathematics major.

MATH 401 Advanced Engineering Mathematics
Credits 3. 3 Lecture Hours.
Engineering mathematics including Perturbation Theory, Fourier series and partial differential equations. Designed primarily for engineering majors. Others must have consent of instructor.
Prerequisite: MATH 308.

MATH 403 Mathematics and Technology
Credits 3. 3 Lecture Hours.
Mathematical problem-solving and communication through the use of various technologies (both hardware and software). Intended primarily, but not limited to, students working toward teacher certification.
Prerequisite: MATH 367 or MATH 467 with a grade of C or better.

MATH 407 Complex Variables
Credits 3. 3 Lecture Hours.
Fundamental theory of analytic functions, including residues and their applications.
Prerequisite: MATH 221, MATH 251, or MATH 253.

MATH 409 Advanced Calculus I
Credits 3. 3 Lecture Hours.
Axioms of the real number system; point set theory of R1; compactness, completeness and connectedness; continuity and uniform continuity; sequences, series; theory of Riemann integration.
Prerequisites: MATH 220; MATH 221, MATH 251 or MATH 253.

MATH 410 Advanced Calculus II
Credits 3. 3 Lecture Hours.
Differential and integral calculus of functions defined on Rm including inverse and implicit function theorems and change of variable formulas for integration; uniform convergence.
Prerequisites: MATH 304 or MATH 323; MATH 409.

MATH 411 Mathematical Probability
Credits 3. 3 Lecture Hours.
Probability spaces, discrete and continuous random variables, special distributions, joint distributions, expectations, law of large numbers, the central limit theorem.
Prerequisite: MATH 148, MATH 152, or MATH 172.

MATH 412 Theory of Partial Differential Equations
Credits 3. 3 Lecture Hours.
Formulation and solution of partial differential equations of mathematical physics; Fourier series and transform methods, complex variable methods, methods of characteristics and first order equations.
Prerequisite: MATH 308 or approval of instructor.

MATH 414 Fourier Series and Wavelets
Credits 3. 3 Lecture Hours.
Fourier series and wavelets with applications to data compression and signal processing.
Prerequisite: MATH 304, MATH 309, MATH 311, or MATH 323.

MATH 415 Modern Algebra I
Credits 3. 3 Lecture Hours.
A study of groups, rings, fields with emphasis on the theoretical aspects and proofs.
Prerequisite: MATH 220; MATH 304 or MATH 323.

MATH 416 Modern Algebra II
Credits 3. 3 Lecture Hours.
Continuation of topics introduced in MATH 415 including Galois Theory and the Sylow Theorems with emphasis on the theoretical aspects.
Prerequisite: MATH 415; junior or senior classification.
MATH 417 Numerical Methods
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Numerical methods for applications; qualitative discussion of convergence and stability properties; computer implementation; interpolation and quadrature, initial value problems, matrix decompositions, interactive solution of linear and non-linear systems, least squares approximation, boundary value problems for ordinary differential equations.
Prerequisites: MATH 304, MATH 309, MATH 311, or MATH 323; MATH 308; ability to program; junior or senior classification.

MATH 419 Applications of Actuarial Science
Credits 2. 2 Lecture Hours.
Applications of actuarial science using mathematical and statistical methods to assess risk in the insurance and finance industries; emphasis on probability, statistics, finance and economics; focus on using probabilistic models in the estimation of insurance premiums.
Prerequisite: MATH 411 or STAT 414 or approval of math advisor.

MATH 420 Application of Actuarial Science II
Credits 2. 2 Lecture Hours.
Use of mathematical and statistical methods to price various financial instruments, such as bonds; understanding how the term structure of interest rates affect the price of these instruments.
Prerequisite: MATH 325 or concurrent enrollment, or approval of instructor.

MATH 423 Linear Algebra II
Credits 3. 3 Lecture Hours.
Eigenvalues, similarity and canonical forms, advanced topics to be chosen by the instructor.
Prerequisite: MATH 304 or MATH 323, or approval of instructor.

MATH 425 The Mathematics of Contingent Claims
Credits 3. 3 Lecture Hours.
The mathematical theory associated with asset price dynamics; binomial pricing models; Black-Scholes analysis; hedging; volatility smile; implied volatility trees; implied binomial trees.
Prerequisites: MATH 172 or equivalent; MATH 308 or equivalent; basic probability.

MATH 427 Introduction to Number Theory
Credits 3. 3 Lecture Hours.
Prime and composite integers; Euclidean algorithm; modular arithmetic; Chinese remainder theorem; unique factorization; quadratic reciprocity; Riemann zeta function; representation of numbers as a sum of squares.
Prerequisites: MATH 220; MATH 304 or MATH 323.

MATH 431 Structures and Methods of Combinatorics
Credits 3. 3 Lecture Hours.
Enumerative techniques generating functions, partially ordered sets, elementary graph theory, elementary Ramsey theory.
Prerequisite: MATH 220 or MATH 302 or approval of instructor.

MATH 433 Applied Algebra
Credits 3. 3 Lecture Hours.
An introduction to groups, rings, fields with emphasis on modular arithmetic; applications to number theory, coding theory, and other areas.
Prerequisites: MATH 220 or MATH 302; MATH 304 or MATH 323.

MATH 436 Introduction to Topology
Credits 3. 3 Lecture Hours.
Metric spaces; continuity of metric spaces; topological spaces; basic notions; separation axioms; compactness; local compactness; connectedness; basic notions in homotopy theory; quotient spaces, paracompactness and topological manifolds.
Prerequisites: MATH 220; MATH 221, MATH 251, or MATH 253.

MATH 437 Principles of Numerical Analysis
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Mathematical principles of numerical analysis and their application to the study of particular methods; fixed-point iteration, Newton’s method; normed vector spaces and operators, Schur decomposition, convergent matrices, minimization methods, conjugate gradient method; polynomial interpolation of Lagrange and Hermite; best approximation, Bernstein and Weierstrass Theorems, numerical quadrature.
Prerequisites: MATH 304, MATH 309, MATH 311, or MATH 323; MATH 308; MATH 409; ability to program; junior or senior classification.

MATH 446 Principles of Analysis I
Credits 3. 3 Lecture Hours.
Construction of the real and complex numbers; topology of metric spaces, compactness and connectedness; Cauchy sequences, completeness and the Baire Category Theorem; Continuous Mappings; introduction to Point-Set Topology.
Prerequisites: MATH 409; junior or senior classification.

MATH 447 Principles of Analysis II
Credits 3. 3 Lecture Hours.
Riemann-Stieltjes integration; sequences and series of functions; the Stone-Weierstrass and Arzela-Ascoli Theorems; introduction to Lebesgue measure theory and integration.
Prerequisites: MATH 446 or approval of instructor; junior or senior classification.

MATH 460 Tensors and General Relativity
Credits 3. 3 Lecture Hours.
Vectors and tensors in special relativity, curvature, manifolds, covariant differentiation, Einstein field equations, Schwarzschild geometry and black holes, cosmology, gauge field theories.
Prerequisites: MATH 308; PHYS 331 or MATH 323 or MATH 311; junior or senior classification.

MATH 467 Modern Geometry
Credits 3. 3 Lecture Hours.
Rigorous development of Euclidean Geometry; Classic non-Euclidean models; Matrix representations of transformations in R3; Isometries; Transformation and symmetric groups; Similarity and Affine transformations.
Prerequisite: MATH 304 or MATH 323.
MATH 469 Introduction to Mathematical Biology
Credits 3. 3 Lecture Hours.
Introduction to mathematical modeling techniques in the biological sciences; continuous versus discrete models; deterministic versus stochastic models; includes population dynamics and ecology, spread of infectious diseases, population genetics and evolution, spatial pattern formation.
Prerequisites: MATH 304 or MATH 323; MATH 308 or equivalent.

MATH 470 Communications and Cryptography
Credits 3. 3 Lecture Hours.
Introduction to coded communications, digital signatures, secret sharing, one-way functions, authentication, error control and data compression.
Prerequisites: MATH 304 or MATH 309 or MATH 311 or MATH 323; CSCE 110 or CSCE 111 or CSCE 121 or CSCE 206 or ENGR 112; approval of instructor.

MATH 471 Communications and Cryptography II
Credits 3. 3 Lecture Hours.
Additional topics in coded communications; information and entropy, elliptical curves, error corrections, quantum methods.
Prerequisites: MATH 470 or consent of instructor.

MATH 482 Research Seminar
Credits 3. 3 Lecture Hours.
Problems, methods and recent developments in mathematics, with emphasis on projects, and written and oral presentations. May be repeated for credit.
Prerequisites: MATH 409 or MATH 415 (may be taken concurrently); junior or senior classification; approval of instructor.

MATH 485 Directed Studies
Credits 1 to 8. 1 to 8 Other Hours.
Special problems in mathematics not covered by any other course in the curriculum. Work may be in either theory or laboratory.
Prerequisite: Approval of department head.

MATH 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of mathematics. May be repeated for credit.
Prerequisite: Approval of instructor.

MATH 490 The Putnam Challenge
Credit 1. 1 Lecture Hour.
Intensive individualized training for preparation for the Putnam Exam, a national contest for mathematics majors. May be taken four times for credit.
Prerequisites: Approval of instructor; junior or senior classification.

MATH 491 Research
Credits 0 to 3. 0 to 3 Other Hours.
Active research of basic nature under supervision of Department of Mathematics or affiliated department graduate faculty member; a maximum of 6 hours of credit can be used in degree plans. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Mathematics or applied mathematical sciences major; junior or senior classification or approval of mathematics advisor.

MATH 601 Methods of Applied Mathematics I
Credits 3. 3 Lecture Hours.
Methods of linear algebra, vector analysis and complex variables.
Prerequisite: MATH 308 or equivalent.

MATH 602 Methods and Applications of Partial Differential Equations
Credits 3. 3 Lecture Hours.
Classification of linear partial differential equations of the second order; Fourier series, orthogonal functions, applications to partial differential equations; special functions, Sturm-Liouville theory, application to boundary value problems; introduction to Green's functions; finite Fourier transforms.
Prerequisites: MATH 601 or MATH 308 and MATH 407.

MATH 603 Methods of Applied Mathematics II
Credits 3. 3 Lecture Hours.
Tensor algebra and analysis; partial differential equations and boundary value problems; Laplace and Fourier transform methods for partial differential equations.
Prerequisite: MATH 601 or MATH 311.

MATH 604 Mathematical Foundations of Continuum Mechanics
Credits 3. 3 Lecture Hours.
Mathematical description of continuum mechanics principles, including: tensor analysis, generalized description of kinematics and motion, conservation laws for mass and momentum; invariance and symmetry principles; application to generalized formulation of constitutive expressions for various fluids and solids.
Prerequisites: MATH 410; MATH 451 or equivalent.

MATH 605 Mathematical Fluid Dynamics
Credits 3. 3 Lecture Hours.
Derivation of basic equations of motion; Navier-Stokes equations; potential equations; some exact solutions in two and three dimensions; equations of boundary layer theory; vorticity-stream function formulation and vortex dynamics; introduction to hydrodynamic stability; introduction to equations of turbulence.
Prerequisite: MATH 601 or equivalent.

MATH 606 Theory of Probability I
Credits 3. 3 Lecture Hours.
Measure and integration, convergence concepts, random variables, independence and conditional expectation, laws of large numbers, central limit theorems, applications.
Prerequisite: MATH 607 or approval of instructor.

MATH 607 Real Variables I
Credits 3. 3 Lecture Hours.
Lebesgue measure and integration theory, differentiation, Lp-spaces, abstract integration, signed measures; Radon-Nikodym theorem, Riesz representation theorem, integration on product spaces.
Prerequisite: MATH 447 or equivalent.

MATH 608 Real Variables II
Credits 3. 3 Lecture Hours.
Banach spaces, theorems of Hahn-Banach and Banach-Steinhaus, the closed graph and open mapping theorems, Hilbert spaces, topological vector spaces and weak topologies.
Prerequisite: MATH 607.

MATH 609 Numerical Analysis
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Interpolation, numerical evaluation of definite integrals and solution of ordinary differential equations; stability and convergence of methods and error estimates.
Prerequisite: Knowledge of computer programming (C or FORTRAN).
MATH 610 Numerical Methods in Partial Differential Equations  
Credits 3. 3 Lecture Hours.  3 Lab Hours.  
Introduction to finite difference and finite element methods for solving partial differential equations; stability and convergence of methods and error bounds.  
Prerequisite: MATH 417 or MATH 609 or equivalent; knowledge of computer programming.

MATH 611 Introduction to Ordinary and Partial Differential Equations  
Credits 3. 3 Lecture Hours.  
Prerequisite: MATH 410 or equivalent or instructor’s approval.

MATH 612 Partial Differential Equations  
Credits 3. 3 Lecture Hours.  
Theory of linear partial differential equations; Sobolev spaces; elliptic equations (including boundary value problems and spectral theory); linear evolution equations of parabolic and hyperbolic types (including initial and boundary value problems). As time permits, additional topics might be included.  
Prerequisite: MATH 611 and MATH 607 or MATH 641, or approval of instructor.

MATH 613 Graph Theory  
Credits 3. 3 Lecture Hours.  
One or more broad areas of graph theory or network theory, such as planarity, connectivity, Hamiltonian graphs, colorings of graphs, automorphisms of graphs, or network theory.  
Prerequisite: MATH 431 or equivalent or approval of instructor.

MATH 614 Dynamical Systems and Chaos  
Credits 3. 3 Lecture Hours.  
Discrete maps; continuous flows; dynamical systems; Poincaré maps; symbolic dynamics; chaos, strange attractors; fractals; computer simulation of dynamical systems.  
Prerequisites: MATH 308; MATH 601 or equivalent.

MATH 615 Introduction to Classical Analysis  
Credits 3. 3 Lecture Hours.  
Set-theoretic preliminaries; Cantor-Schröder-Bernstein Theorem; review of sequences; limit inferior and limit superior; infinite products; metric spaces; convergence of functions; Dini’s Theorem, Weierstrass Approximation Theorem; monotone functions; bounded variation; Helly’s Selection Theorem; Riemann-Stieltjes integration; Fourier series; Fejer’s Theorem; Parseval’s Identity; Bernstein’s Theorem on absolutely convergent Fourier series.  
Prerequisite: MATH 409 or equivalent.

MATH 617 Theory of Functions of a Complex Variable I  
Credits 3. 3 Lecture Hours.  
Holomorphic functions, complex integral theorems, Runge’s theorem, residue theorem, Laurent series, conformal mapping, harmonic functions.  
Prerequisite: MATH 410.

MATH 618 Theory of Functions of a Complex Variable II  
Credits 3. 3 Lecture Hours.  
Infinite products, Weierstrass factorization theorem, Mittag-Leffler’s theorem, normal families, Riemann mapping theorem, analytic continuation, Picard’s theorems and selected topics.  
Prerequisite: MATH 617.

MATH 619 Applied Probability  
Credits 3. 3 Lecture Hours.  
Measure Theory; Lebesgue integration; random variables; expectation; condition expectation martingales and random walks; designed for beginning graduate students in mathematics, statistics, the sciences and engineering and students in economics and finance with a strong mathematical background.  
Prerequisites: MATH 409 and MATH 411.

MATH 620 Algebraic Geometry I  
Credits 3. 3 Lecture Hours.  
Affine and projective varieties; sheaves; cohomology; Riemann-Roch Theorem for curves.  
Prerequisite: MATH 653 or approval of instructor.

MATH 622 Differential Geometry I  
Credits 3. 3 Lecture Hours.  
Surfaces in 3-D space and generalizations to submanifolds of Euclidean space; smooth manifolds and mappings; tensors; differential forms; Lie groups and algebras; Stokes’ theorem; deRham cohomology; Frobenius theorem; Riemannian manifolds.  
Prerequisites: MATH 304 or equivalent; approval of instructor.

MATH 623 Differential Geometry II  
Credits 3. 3 Lecture Hours.  
Curvature of Riemannian manifolds; vector bundles; connections; Maurer-Cartan Form; Laplacian; geodesics; Chern-Gauss-Bonnet theorem; additional topics to be selected by the instructor.  
Prerequisites: MATH 622 or approval of instructor.

MATH 625 Applied Stochastic Differential Equations  
Credits 3. 3 Lecture Hours.  
Stochastic integration, Ito Calculus and applications of stochastic differential equations to finance and engineering.  
Prerequisite: MATH 619.

MATH 626 Analytic Number Theory  
Credits 3. 3 Lecture Hours.  
Analytic properties of the Riemann zeta function and Dirichlet L-functions; Dirichlet characters; prime number theorem; distribution of primes in arithmetic progressions; Siegel’s theorem; the large sieve inequalities; Bombieri-Vinogradov theorem.  
Prerequisite: MATH 617.

MATH 627 Algebraic Number Theory  
Credits 3. 3 Lecture Hours.  
Algebraic number fields and rings of algebraic integers; arithmetic in algebraic number fields; ideals; unique factorization of ideals; ideal classes and the class group; finiteness of the class number; Minkowski’s theorem; Dirichlet’s unit theorem; quadratic and cyclotomic number fields; splitting of primes in extension fields.  
Prerequisite: MATH 653 or approval of instructor.

MATH 628 Mathematics of Finance  
Credits 3. 3 Lecture Hours.  
Pricing of financial derivatives in different market models; discrete models: Arrow-Debreu, Binomial model, Hedging; Stochastic calculus; Brownian Motion, stochastic integrals, Ito formula; continuous model: Black-Scholes formula for pricing European and American options; equivalent Martingale Measures, pricing of exotic options.  
Prerequisite: MATH 606 or MATH 619 or approval of instructor.
MATH 629 History of Mathematics
Credits 3. 3 Lecture Hours.
Major events in the evolution of mathematical thought from ancient
times to the present, the development of various important branches of
mathematics, including numeration, geometry, algebra, analysis, number
theory, probability, and applied mathematics.
Prerequisite: MATH 304 or equivalent.

MATH 630 Combinatorics
Credits 3. 3 Lecture Hours.
This is an introduction at the graduate level to the fundamental ideas
and results of combinatorics, including enumerative techniques, sieve
methods, partially ordered sets and generating functions.
Prerequisite: undergraduate discrete math course or permission of
instructor.

MATH 636 Topology I
Credits 3. 3 Lecture Hours.
Set theory, topological spaces, generalized convergence, compactness,
meterization, connectedness, uniform spaces, function spaces.
Prerequisite: Approval of instructor.

MATH 637 Topology II
Credits 3. 3 Lecture Hours.
Continuation of MATH 636.
Prerequisite: MATH 636 or approval of instructor.

MATH 638 Hyperbolic Conservation Laws
Credits 3. 3 Lecture Hours.
Introduction to basic theory and numerical methods for first order nonlinear
partial differential equations; basic existence-uniqueness theory for
scalar conservation laws; special equations and systems of interest in
various applications and Riemann problem solutions for such systems;
design of numerical methods for general hyperbolic systems; stability and
convergence properties of numerical methods.
Prerequisite: MATH 610 or MATH 612 or approval of instructor.

MATH 639 Iterative Techniques
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Numerical methods for solving linear and nonlinear equations and systems
of equations; eigenvalue problems.
Prerequisites: Elementary linear algebra and knowledge of computer
programming (C or FORTRAN).

MATH 640 Linear Algebra for Applications
Credits 3. 3 Lecture Hours.
Review of linear algebra; spectral theory in inner product spaces;
decomposition theorems; duality theory and multilinear algebra; tensor
products; applications. May be taken concurrently with MATH 641.
Prerequisite: MATH 304 or equivalent.

MATH 641 Analysis for Applications I
Credits 3. 3 Lecture Hours.
Review of preliminary concepts; sequence and function spaces; normed
linear spaces, inner product spaces; spectral theory for compact
operators; fixed point theorems; applications to integral equations and the
calculus of variations.
Prerequisites: MATH 447 and MATH 640 or approval of instructor.

MATH 642 Analysis for Applications II
Credits 3. 3 Lecture Hours.
Distributions and differential operators; transform theory; spectral theory
for unbounded self-adjoint operators; applications to partial differential
equations; asymptotics and perturbation theory.
Prerequisite: MATH 641.

MATH 643 Algebraic Topology I
Credits 3. 3 Lecture Hours.
Fundamental ideas of algebraic topology, homotopy and fundamental
group, covering spaces, polyhedra.
Prerequisite: Approval of instructor.

MATH 644 Algebraic Topology II
Credits 3. 3 Lecture Hours.
Homology and cohomology theory.
Prerequisite: MATH 643.

MATH 645 A Survey of Mathematical Problems I
Credits 3. 3 Lecture Hours.
A survey of problems in various branches of mathematics, such as logic,
probability, graph theory, number theory, algebra and geometry.
Prerequisites: MATH 409, MATH 415, MATH 423 or approval of
instructor.

MATH 646 A Survey of Mathematical Problems II
Credits 3. 3 Lecture Hours.
A survey of problems in various branches of mathematics such as algebra,
geometry, differential equations, real analysis, complex analysis, calculus
of variations.
Prerequisite: MATH 645 or approval of instructor.

MATH 647 Mathematical Modeling
Credits 3. 3 Lecture Hours.
The process and techniques of mathematical modeling; covers a variety
of application areas and models such as ordinary and partial differential
equations, stochastic models, discrete models and problems involving
optimization.
Prerequisite: MATH 442 or approval of instructor.

MATH 648 Computational Algebraic Geometry
Credits 3. 3 Lecture Hours.
Broad introduction to algorithmic algebraic geometry, including numerical
and complexity theoretic aspects; theory behind the most efficient modern
algorithms for polynomial system solving and the best current quantitative/
geometric estimates on algebraic sets over various rings is derived.
Prerequisite: MATH 653 or approval of instructor.

MATH 650 Several Complex Variables
Credits 3. 3 Lecture Hours.
Introduction to function theory in several complex variables with an
emphasis on the analytic and partial differential equations aspects of the
subject.
Prerequisites: MATH 608 and MATH 618 or equivalents.

MATH 651 Optimization I
Credits 3. 3 Lecture Hours.
Fundamentals of mathematical analysis underlying theory of constrained
optimizations for a finite number of variables, necessary and sufficient
conditions for constrained extrema of equality constraint problems,
sufficient conditions for fulfillment of constraint qualification, computational
methods for concave programming problems and applications.
Prerequisite: MATH 410 or approval of instructor.

MATH 652 Optimization II
Credits 3. 3 Lecture Hours.
Necessary conditions of calculus of variations, elementary theory of
games, formulation of basic control problem, Hestenes' necessary
conditions for optimal control, transformations, methods of computation
and applications.
Prerequisite: MATH 651.
MATH 653 Algebra I  
Credits 3. 3 Lecture Hours.  
Survey of groups, rings, ideals.  
Prerequisite: MATH 415 or approval of instructor.

MATH 654 Algebra II  
Credits 3. 3 Lecture Hours.  
Survey of modules, field extensions, Galois theory.  
Prerequisite: MATH 653 or approval of instructor.

MATH 655 Functional Analysis I  
Credits 3. 3 Lecture Hours.  
Normed linear spaces, duality theory, reflexivity, operator theory. Banach algebras, spectral theory, representation theory.  
Prerequisite: MATH 608.

MATH 656 Functional Analysis II  
Credits 3. 3 Lecture Hours.  
Topological linear spaces, locally convex spaces, duality in locally convex spaces, ordered topological vector spaces, distribution theory, applications to analysis.  
Prerequisite: MATH 655.

MATH 658 Applied Harmonic Analysis  
Credits 3. 3 Lecture Hours.  
Fourier series and Fourier Transform; discrete (fast) Fourier transform; discrete cosine transform; local cosine transform; Radon transform; filters; harmonic analysis on the sphere; radial, periodic and spherical basis functions; applications.  
Prerequisites: MATH 304; MATH 308 or equivalent.

MATH 660/CSCE 660 Computational Linear Algebra  
Credits 3. 3 Lecture Hours.  
Techniques in matrix computation: elimination methods, matrix decomposition, generalized inverses, orthogonalization and least-squares, eigenvalue problems and singular value decomposition, iterative methods and error analysis.  
Prerequisite: MATH 417 or equivalent or CSCE 442 or equivalent.  
Cross Listing: CSCE 660/MATH 660.

MATH 661 Mathematical Theory of Finite Element Methods  
Credits 3. 3 Lecture Hours.  
Will develop basic mathematical theory of finite element method; construction of finite element spaces and piece-wise polynomial approximation; Ritz-Galerkin methods and variational crimes; energy and error analysis.  
Prerequisite: MATH 410; ENGR finite element class on MATH 419 or MATH 415 or approval of instructor.  
Knowledge of C++.

MATH 662 Seminar in Algebra  
Credits 3. 3 Lecture Hours.  
Problems, methods and recent developments in algebra. May be repeated for credit.  
Prerequisite: Approval of instructor.

MATH 663 Seminar in Analysis  
Credits 3. 3 Lecture Hours.  
Problems, methods and recent developments in analysis. May be repeated for credit.  
Prerequisite: Approval of instructor.

MATH 664 Seminar in Applied Mathematics  
Credits 3. 3 Lecture Hours.  
Problems, methods and recent developments in applied mathematics. May be repeated for credit.  
Prerequisite: Approval of instructor.

MATH 666 Seminar in Geometry  
Credits 3. 3 Lecture Hours.  
Problems, methods and recent developments in geometry. May be repeated for credit.  
Prerequisite: Approval of instructor.

MATH 667 Foundations and Methods of Approximation  
Credits 3. 3 Lecture Hours.  
Existence, uniqueness and characterization of best approximations; polynomial and rational approximants; Bernstein polynomials; Bernstein and Markov inequalities; ridge functions; approximation from shift-invariant subspaces; orthogonal polynomials; neural networks, radial basis functions, scattered-data surface fitting; subdivision analysis.  
Prerequisites: MATH 407 and MATH 409.

MATH 669 Seminar in Mathematical Biology  
Credits 3. 3 Lecture Hours.  
Problems, methods and recent developments in Mathematical Biology. May be repeated for credit.  
Prerequisite: Approval of instructor.

MATH 670 Applied Mathematics I  
Credits 3. 3 Lecture Hours.  
Mathematical tools of applied mathematics; Fredholm alternative; integral operators; Green's functions; unbounded operators; Stone's theorem; distributions; convolutions; Fourier transforms; applications.  
Prerequisite: MATH 642 or equivalent.

MATH 671 Applied Mathematics II  
Credits 3. 3 Lecture Hours.  
Advanced mathematical tools of applied mathematics; Fredholm alternative; integral operators; Green's functions; unbounded operators; Stone's theorem; distributions; convolutions; Fourier transforms; applications.  
Prerequisites: MATH 642 or equivalent.

MATH 672 Hydrodynamic Stability  
Credits 3. 3 Lecture Hours.  
Instability mechanisms; instability of interfacial and free surface flows; thermal instability, centrifugal instability, instability of inviscid and viscous parallel shear flows; fundamental concepts and applications of nonlinear instability; the onset of turbulence; various transitions to turbulence.  
Prerequisites: MATH 601 or equivalent; MATH 605 or equivalent.

MATH 673 Information, Secrecy and Authentication I  
Credits 3. 3 Lecture Hours.  
Preliminaries; probability, information, entropy, signals, channels: group-theoretic view of messages: contemporary secrecy and digital signature systems; one-time pads, DES, RSA, DSS, wheels, LFSR-based systems; analog scramblers; key exchange, key management, secret sharing, access structures; measures of security.  
Prerequisites: Graduate classification and approval of instructor.

MATH 674 Information, Secrecy and Authentication II  
Credits 3. 3 Lecture Hours.  
Advanced information theory, cryptography, authentication, and access control.  
Prerequisites: MATH 673 or approval of instructor.

MATH 675 Information, Secrecy and Authentication III  
Credits 3. 3 Lecture Hours.  
Advanced information theory, cryptography, authentication, and access control.  
Prerequisites: MATH 674 or approval of instructor.

MATH 676 Finite Element Methods in Scientific Computing  
Credits 3. 3 Lecture Hours.  
Basic finite element methods; structure of finite element codes; assembling linear systems of equations and algorithmic aspects; linear iterative solvers; adaptive mesh refinement; vector-valued and mixed problems; nonlinear problems; visualization; parallelization aspects. Additional topics may be chosen by instructor.  
Prerequisites: MATH 610; ENGR finite element class on MATH 419 or MATH 609; approval of instructor. Knowledge of C++.

MATH 684 Professional Internship  
Credits 1 to 6. 1 to 6 Other Hours.  
Directed internship in an organization to provide students with professional experience in organization settings appropriate to the student's career objectives.  
Prerequisite: Approval of department head.
MATH 685 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Offered to enable students to undertake and complete, with credit, limited investigations not within their thesis research and not covered by any other courses in the curriculum.
Prerequisite: Approval of instructor.

MATH 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of mathematics. May be repeated for credit.
Prerequisite: Approval of instructor.

MATH 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research for thesis or dissertation.

MATH 695 Frontiers in Mathematical Research
Credits 3. 3 Lecture Hours.
This course is designed to acquaint the graduate student with the present status of investigative work in a variety of mathematical fields. Content will depend on the availability of visiting lecturers who will be selected because of distinguished international recognition in their fields of research. May be taken two times for credit.
Prerequisite: Graduate classification.

MATH 696 Mathematical Communication and Technology
Credits 3. 3 Lecture Hours.
Techniques of oral, written and electronic communication of mathematics; effective classroom and seminar presentation; \LaTeX, HTML and Javascript; developing Internet applications; Maple and Matlab; classroom use of computer graphics.
Prerequisite: Approval of instructor.

MEEN - Mechanical Engineering

Courses

MEEN 210 Geometric Modeling for Mechanical Design
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Foundations of geometric modeling as applied to mechanical design through use of modern computer-aided design (CAD) and physical prototyping tools; basics of systematic design methodology; geometric visualization concepts: multiview orthographic, isometric, oblique, perspective; three-dimensional representations, surface and solid modeling; dimensioning and tolerancing; rapid prototyping using 3D printing.
Prerequisites: Mechanical engineering major; ENGR 111.

MEEN 221 Statics and Particle Dynamics
Credits 3. 3 Lecture Hours.
Application of the fundamental principles of Newtonian mechanics to the statics and dynamics of particles; equilibrium of trusses, frames, beams and other rigid bodies.
Prerequisites: For non-mechanical engineering majors; admission to an engineering major; MATH 251 or MATH 253 or registration therein; PHYS 218.

MEEN 222 Materials Science
Credits 3. 3 Lecture Hours.
Mechanical, optical, thermal, magnetic and electrical properties of solids; differences in properties of metals, polymers, ceramics and composite materials in terms of bonding and crystal structure.
Prerequisites: CHEM 102, or CHEM 104 and CHEM 114, or CHEM 107 and CHEM 117; PHYS 218.

MEEN 225 Engineering Mechanics
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Application of the laws of classical mechanics to simplified, plausibly real world problems or interest to mechanical engineering, including the analysis of cables, frames, trusses, beams, machines and mechanisms.
Prerequisites: Mechanical engineering major; MATH 251 or MATH 253 or registration therein; PHYS 218.

MEEN 260 Mechanical Measurements
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Introduction to the basic principles of engineering experimentation including: instrumentation and measurement techniques, signal processing and data acquisition, statistical data analysis, and interpretation and reporting of results.
Prerequisites: MEEN 225, ECEN 215, MATH 308 and MEEN 315 or registration therein.

MEEN 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of mechanical engineering. May be repeated for credit.
Prerequisite: Approval of instructor.

MEEN 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in mechanical engineering. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

MEEN 315 Principles of Thermodynamics
Credits 3. 3 Lecture Hours.
Principles of Thermodynamics.
Prerequisites: MEEN 225; MATH 251 or MATH 253; junior or senior classification.

MEEN 333 Project Management for Engineers
Credits 3. 3 Lecture Hours.
Basic project management for engineering undergraduates; project development and economic justification; estimating; scheduling; network methods; critical path analysis; earned value management; recycling and rework; project organizational structures; project risk assessment; resource allocation; ethics; characteristics of project managers.
Prerequisite: Junior or senior classification in Dwight Look College of Engineering.
Cross Listing: CVEN 333 and ISEN 333.

MEEN 344 Fluid Mechanics
Credits 3. 3 Lecture Hours.
Application of laws of statics, buoyancy, stability, energy and momentum to behavior of ideal and real fluids; dimensional analysis and similitude and their application to flow through ducts and piping; lift and drag and related problems.
Prerequisites: MEEN 225 and MEEN 315.

MEEN 345 Fluid Mechanics Laboratory
Credit 1. 3 Lab Hours.
Introduction to basic fluid mechanics instrumentation; experimental verification and reinforcement of the analytical concepts introduced in MEEN 344.
Prerequisites: MEEN 260; MEEN 344 or registration therein.
MEEN 357 Engineering Analysis for Mechanical Engineers  
Credits 3. 3 Lecture Hours.  
Practical foundation for the use of numerical methods to solve engineering problems: Introduction to Matlab, error estimation, Taylor series, solution of non-linear algebraic equations and linear simultaneous equations; numerical integration and differentiation; initial value and boundary value problems; finite difference methods for parabolic and elliptic partial differential equations.  
Prerequisites: ENGR 112 and MATH 308.

MEEN 360 Materials and Manufacturing Selection in Design  
Credits 3. 3 Lecture Hours.  
Selecting materials and manufacturing processes in design; emphasis on material mechanical properties; microstructure production and control; manufacturing processes for producing various shapes for components and structures; use of design methodology.  
Prerequisites: MEEN 222, MEEN 260; CVEN 305; junior or senior classification; or approval of instructor.

MEEN 361 Materials and Manufacturing in Design Laboratory  
Credit 1. 3 Lab Hours.  
Experiments in materials characterization and manufacturing processes; emphasis on material mechanical properties; microstructure production and control; manufacturing processes for producing various shapes for components and structures.  
Prerequisites: MEEN 222, MEEN 260; CVEN 305 or MEEN 360 or registration therein; junior or senior classification or approval of instructor.

MEEN 363 Dynamics and Vibrations  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Dynamics and Vibration. Application of Newtonian and energy methods to model dynamic systems (particles and rigid bodies) with ordinary differential equations; solution of models using analytical and numerical approaches; interpreting solutions; linear vibrations.  
Prerequisites: MEEN 225; MATH 308; MEEN 357 or CVEN 302, or registration therein; CVEN 305 or registration therein.

MEEN 364 Dynamic Systems and Controls  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Mathematical modeling, analysis, measurement and control of dynamic systems; extensions of modeling techniques of MEEN 363 to other types of dynamic systems; introduction to feedback control, time and frequency domain analysis of control systems, stability, PID control, root locus; design and implementation of computer-based controllers in the lab.  
Prerequisites: MEEN 260 and MEEN 363; ECEN 215.

MEEN 368 Solid Mechanics in Mechanical Design  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Stress analysis of deformable bodies and mechanical elements; stress transformation; combined loading; failure modes; material failure theories; fracture and fatigue; deflections and instabilities; thick cylinders; curved beams; design of structural/mechanical members; design processes.  
Prerequisites: CVEN 305; MEEN 357 and MEEN 360 or registration therein; junior or senior classification.

MEEN 381 Seminar  
Credit 1. 2 Other Hours.  
Presentations by practicing engineers and faculty addressing: effective communications, engineering practices, professional registration, ethics, career-long competence, contemporary issues, impact of technology on society and being informed; preparation of a resume, a lifelong learning plan, two papers, two oral presentations and complete an online assessment of the mechanical engineering program.  
Prerequisite: Upper-level classification in mechanical engineering.

MEEN 401 Introduction to Mechanical Engineering Design  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
The design innovation process; need definition, functional analysis, performance requirements and evaluation criteria, conceptual design evaluation, down-selected to an embodiment; introduction to systems and concurrent engineering; parametric and risk analysis, failure mode analysis, material selection, and manufacturability; cost and life cycle issues, project management.  
Prerequisites: MEEN 360, MEEN 361, MEEN 364, MEEN 368, MEEN 461.

MEEN 402 Intermediate Design  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Product detail design and development process including case studies; project management, marketing considerations, manufacturing, detailed design specifications; failure modes, application of codes and standards, selection of design margins; product (component) development guidelines; intellectual property, product liability and ethical responsibility.  
Prerequisites: MEEN 401; junior or senior classification.

MEEN 404 Engineering Laboratory  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Systematic design of experimental investigations; student teams identify topics and develop experiment designs including: establishing the need; functional decomposition; requirements; conducting the experiment; analyzing and interpreting the results and written and oral reports documenting the objectives, procedure, analysis, and results and conclusion of two or three experiments.  
Prerequisites: MEEN 260, MEEN 360, MEEN 361, MEEN 364; MEEN 461; MEEN 401 or registration therein; junior or senior classification.

MEEN 408 Introduction to Robotics  
Credits 3. 3 Lecture Hours.  
Forward and inverse kinematics of robot manipulators, path planning, motion planning for mobile robots, dynamics of robot manipulators, control algorithms; computed torque algorithm, adaptive control algorithms and current topics in mobile robots; cooperative motion planning of mobile robots and formation control.  
Prerequisites: MEEN 364 or equivalent; junior or senior classification.

MEEN 410 Internal Combustion Engines  
Credits 3. 3 Lecture Hours.  
Thermodynamics of cycles for internal combustion engines and gas turbines, including fuels and combustion; performance characteristics of various types of engines.  
Prerequisite: MEEN 344 or equivalent or approval of instructor.

MEEN 411 Mechanical Controls  
Credits 3. 3 Lecture Hours.  
Application of classical and modern control theory techniques to modeling, analysis and synthesis of linear, mechanical control systems.  
Prerequisite: MEEN 364.

MEEN 414 Principles of Turbomachinery  
Credits 3. 3 Lecture Hours.  
Aero-therodynamic and mechanical design of turbomachinery components including steam and gas turbine stages, compressor stages, and inlet and exhaust systems, and their integration into power and thrust generation units; design and off-design behaviors of turbine and compressor stages and units; design with SolidWorks.  
Prerequisites: MEEN 421 or approval of instructor; junior or senior classification.
MEEN 417/NUEN 417 Basics of Plasma Engineering and Applications
Credits 3.3 Lecture Hours.
Basic plasma properties and confinement techniques; single particle orbits in electric and magnetic fields, moments of Boltzmann equation and introduction to fluid theory; wave phenomena in plasmas and introduction to plasma kinetic theory; analysis of laboratory plasmas and plasma applications including fusion, electric propulsion, materials processing and plasmas enhanced chemistry.
Prerequisites: PHYS 208 or equivalent; senior classification in nuclear, mechanical or aerospace engineering, physics, or approval of instructor.
Cross Listing: NUEN 417/MEEN 417.

MEEN 421 Thermal-Fluids Analysis and Design
Credits 3.3 Lecture Hours.
Integration of thermodynamics, fluid mechanics and heat transfer through application to the design of various thermal systems comprised of several components requiring individual analyses; analysis of the entire system; representative applications of thermal-fluids analysis with a design approach.
Prerequisites: MEEN 461; MEEN 315; junior or senior classification.

MEEN 430 Nanomaterials
Credits 3.3 Lecture Hours.
Fundamentals of nanotechnology, including nanomaterials, types of nanomaterials, fabrication, characterization methods, and applications; explore current roles in technology and future impact on such systems on industry.
Prerequisites: Junior or senior classification and approval of instructor.

MEEN 431 Advanced System Dynamics and Controls
Credits 3.3 Lecture Hours.
Unified framework for modeling, analysis, synthesis, design and simulation of mechanical systems with energy exchange across multiple domains; study of mechanical, electrical, hydraulic and thermal subsystems; Newtonian mechanics, rigid body dynamics, multiple degrees of freedom vibrations and control system design.
Prerequisites: MEEN 364; junior or senior classification.

MEEN 432 Automotive Engineering
Credits 3.3 Lecture Hours.
Introduction to vehicle dynamics; application of engineering mechanics principles to analysis of acceleration and braking, cornering and handling; analysis and design of drive train, suspension, brakes, and tires to achieve desired performance.
Prerequisite: MEEN 363.

MEEN 433 Mechatronics
Credits 3.2 Lecture Hours. 3 Lab Hours.
Basic principles of digital logic and analog circuits in mechanical systems; electrical-mechanical interfacing; sensors and actuators; digital control implementation; precision design and system integration.
Prerequisite: MEEN 364 or equivalent.

MEEN 434 Dynamics and Modeling of Mechatronic System
Credits 3.3 Lecture Hours.
Mechatronic interactions in lumped parameter and continuum systems; review of integral and differential electromagnetic laws, including motions; lumped elements and dynamic equations of motion; linear and nonlinear actuators and transducers; field transformation and moving media; electromagnetic force densities and stress tensors.
Prerequisite: MEEN 364.

MEEN 436 Principles of Heating, Ventilating and Air Conditioning
Credits 3.3 Lecture Hours.
Application of thermodynamics fluid mechanics, and heat transfer to the design of HVAC equipment; selection of equipment, piping and duct layouts.
Prerequisite: MEEN 461 or equivalent.

MEEN 437 Principles of Building Energy Analysis
Credits 3.3 Lecture Hours.
Analysis of building energy use by applying thermodynamics and heat transfer to building heating and cooling load calculations; heat balance and radiant time series calculation methods; psychrometric analysis, indoor air quality, effect of solar radiation on heating and cooling of buildings. Required design project.
Prerequisites: MEEN 315 or equivalent; junior or senior classification.

MEEN 441 Design of Mechanical Components and Systems
Credits 3.3 Lecture Hours.
Design of machine elements, characteristics of prime movers, loads and power transmission elements as related to mechanical engineering design.
Prerequisite: MEEN 368 or approval of instructor.

MEEN 442 Computer Aided Engineering
Credits 3.3 Lecture Hours.
Effective and efficient use of modern computer hardware and software in modeling, design, and manufacturing; simulation of a broad spectrum of mechanical engineering problems.
Prerequisites: MEEN 363 and MEEN 368.

MEEN 444 Finite Element Analysis in Mechanical Engineering
Credits 3.3 Lecture Hours.
Introduction to basic theory and techniques; one- and two-dimensional formulations for solid mechanics applications; direct and general approaches; broader aspects for field problems; element equations, assembly and solution schemes; computer implementation, programming and projects; error sources and application consideration.
Prerequisites: MEEN 357 and 368 or equivalents.

MEEN 445 Engineering Applications of Solid Mechanics
Credits 3.3 Lecture Hours.
Mechanical and mathematical basis for modeling response of solid bodies undergoing coupled mechanical and non-mechanical effects, analysis of stress and deformation for structural members subjected to axial, torsional and bending loads, design of multifunctional systems.
Prerequisites: CVEN 305, MEEN 368.

MEEN 451 Viscoelastic Materials
Credits 3.3 Lecture Hours.
Mechanical and mathematical basis for modeling linear viscoelastic materials which focus on polymeric solid materials; characterization of viscoelastic material properties from experimental tests; applications of stress and deformation relationships for viscoelastic structural members subjected to axial, torsional, and bending loads.
Prerequisites: CVEN 305; junior or senior classification.

MEEN 455 Engineering with Plastics
Credits 3.3 Lecture Hours.
Polymer structure, processing, property characterization at the molecular, microscopic and macroscopic dimensional levels for thermosets, thermoplastics, elastomers, fibers and advanced fibrous nanoparticle filled composites and smart multi-performance structures.
Prerequisite: MEEN 222 or approval of instructor.
MEEN 458 Processing and Characterization of Polymers
Credits 3.3 Lecture Hours.
Introduction of flow behavior in polymers; structure-property-process relationship; mixing rules for polymer blends; mechanical properties; laboratory demonstrations: injection molding, extrusion, melt mixing, and study of morphology using OM, SEM, and TEM.
Prerequisite: MEEN 222.

MEEN 459 Sound and Vibration Measurements
Credits 3.3 Lecture Hours.
Basic acoustics, review of vibration theory, wave propagation in vibrating systems, sound radiation from vibrating systems, sound and vibration sensors and instrumentation, data acquisition systems, measurement techniques, spectral analysis, spatial FFT analysis, design of experiments with vibro-acoustic systems, applications.
Prerequisites: MEEN 363, MATH 308.

MEEN 460 Corrosion Engineering
Credits 3.3 Lecture Hours.
Basic corrosion phenomena are described, including mixed potential theory, types of corrosion, experimental methods, and prevention techniques.
Prerequisite: MEEN 360 and MEEN 361, or equivalent.

MEEN 461 Heat Transfer
Credits 3.3 Lecture Hours.
Heat transfer by conduction, convection and radiation: steady and transient conduction, forced and natural convection, and blackbody and gray body radiation; multi-mode heat transfer; boiling and condensation; heat exchangers.
Prerequisites: MEEN 344; MATH 308.

MEEN 463 Cogeneration Systems
Credits 3.3 Lecture Hours.
Design and analysis of cogeneration system; selection of the prime mover, matching power and thermal needs, institutional factors, economic evaluations, financial options and the study of actual and hypothetical systems.
Prerequisite: MEEN 421 or equivalent.

MEEN 464 Heat Transfer Laboratory
Credit 1.3 Lab Hours.
Basic measurement techniques in conduction, convection, and radiation heat transfer; experimental verification of theoretical and semi-empirical results; uncertainty analysis.
Prerequisite: MEEN 345, MEEN 461 or registration therein.

MEEN 467 Mechanical Behavior of Materials
Credits 3.3 Lecture Hours.
Fundamentals of flow and fracture in metals, emphasizing safe design by anticipating response of materials to complex stress and environmental service conditions; micromechanisms of flow, fatigue, creep and fracture; fracture mechanics approach to design. Special emphasis given to microstructure-mechanical property relationship and damage tolerant design.
Prerequisite: MEEN 360 and MEEN 361.

MEEN 471 Elements of Composite Materials
Credits 3.3 Lecture Hours.
Fundamentals concerned with relating structure of multiphase materials to physical properties; plastic, metallic and ceramic matrices reinforced with continuous and discontinuous fibers, whiskers and particulates.
Prerequisites: MEEN 360, MEEN 361, and MEEN 368 or approval of instructor.

MEEN 472 Gas Dynamics
Credits 3.3 Lecture Hours.
Fundamental analysis of compressible flows and its application to supersonic airfoils/projectiles, jet and rocket nozzles, normal and oblique shock waves, explosion waves, shock tubes, supersonic wind tunnels, and compressible pipe flows.
Prerequisite: MEEN 344.

MEEN 475 Materials in Design
Credits 3.3 Lecture Hours.
The heuristics of synthesis of material properties, configuration and processing in the optimization of material selection in the design process; product design and development overview, failure mode effects analysis, design margin establishment; role of the generic failure modes and codes and standards; fundamental characteristics of process methods.
Prerequisites: MEEN 360 and MEEN 361; CVEN 305.

MEEN 476 Nanoscale Issues in Manufacturing
Credits 3.3 Lecture Hours.
Fundamentals of manufacturing techniques at the nanoscale and larger length scales; design approaches and issues; direct fabrication of nanostructures; nanomanufacturing as a building block to larger objects; fabrication of composites and devices utilizing nanoscale components.
Prerequisites: MEEN 222 or approval of instructor; junior or senior classification.

MEEN 477 Air Pollution Engineering
Credits 3.3 Lecture Hours.
Design of air pollution abatement equipment and systems to include cyclones, bag filters, and scrubbers; air pollution regulations; permitting; dispersion modeling; National Ambient Air Quality Standards.
Prerequisite: ENGR 214 or equivalent.
Cross Listing: BAEN 477 and SENG 477.

MEEN 485 Directed Studies
Credits 1 to 6.1 to 6 Other Hours.
Special problems relating to a specific project in some phase of mechanical engineering. A commitment of two semesters with 6 hours 485 credit is required.
Prerequisites: Approval of department head and senior classification.

MEEN 489 Special Topics in...
Credits 1 to 4.1 to 4 Lecture Hours.
Selected topics in an identified area of mechanical engineering.
Prerequisite: Approval of instructor.

MEEN 491 Research
Credits 1 to 4.1 to 4 Other Hours.
Research conducted under the direction of faculty member in mechanical engineering. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor.

MEEN 601 Advanced Product Design
Credits 3.3 Lecture Hours.
Design methodology, functional design, innovation, parameter analysis, design for reliability, manufacturability and strength; design project.
Prerequisite: MEEN 402 or equivalent.
MEEN 603/AERO 605 Theory of Elasticity
Credits 3. 3 Lecture Hours.
Analysis of stress and strain in two and three dimensions, equilibrium and compatibility equations, strain energy methods; torsion of noncircular sections; flexure; axially symmetric problems.
Cross Listing: AERO 605/MEEN 603.

MEEN 606/MSEN 626 Polymer Laboratories
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Introduction to basic experimental skills relating to polymers; experiments include polymerization, molecular weight determination, FTIR, tensile test, NMR, DSC, swelling index, viscosity, x-ray diffraction.
Cross Listing: MSEN 626/MEEN 606.

MEEN 607/MSEN 607 Polymer Physical Properties
Credits 3. 3 Lecture Hours.
Macromolecular concepts; molecular weight characterization; solubility parameters; phase diagrams; viscoelasticity; rheology; thermal behavior; damage phenomena, morphology; crystallization; liquid crystallinity; nanocomposites.
Prerequisite: MEEN 222 or equivalent.
Cross Listing: MSEN 607/MEEN 607.

MEEN 608/MEMA 602 Continuum Mechanics
Credits 3. 3 Lecture Hours.
Development of field equations for analysis of continua (solids as well as fluids); conservation laws: kinematics, constitutive behavior of solids and fluids; applications to aerospace engineering problems involving solids and fluids.
Prerequisite: Graduate classification.
Cross Listing: MEMA 602/AERO 603.

MEEN 609 Materials Science
Credits 3. 3 Lecture Hours.
Structure and properties of solid materials.
Prerequisites: Undergraduate level Materials, Science and Engineering course.

MEEN 610 Applied Polymer Science
Credits 3. 3 Lecture Hours.
Macromolecular concepts, molecular weight, tacticity, theory of solutions, rubber elasticity, thermal transitions, rheology, crystallinity, heterogeneous systems and relation of mechanical and physical characteristics to chemical structure; applications to polymer blends, thermosetting resins, structural adhesives and composites; design and processing of fibrous composites.
Prerequisite: Graduate classification; ENGR 213.

MEEN 612 Mechanics of Robot Manipulators
Credits 3. 3 Lecture Hours.
Kinematics, dynamics and control of industrial robot manipulators.
Prerequisites: MEEN 364 and MEEN 411 or approval of instructor.

MEEN 613 Engineering Dynamics
Credits 3. 3 Lecture Hours.
Three dimensional study of dynamics of particles and rigid bodies and application to engineering problems; introduction to Lagrange equations of motion and Hamilton’s principle.
Prerequisites: MEEN 363; MATH 308.

MEEN 614 Design and Modeling of Viscoelastic Structures
Credits 3. 3 Lecture Hours.
To provide the mechanical and mathematical basis for modeling linear viscoelastic materials.
Prerequisite: CVEN 305 or equivalent.

MEEN 615 Advanced Engineering Thermodynamics
Credits 3. 3 Lecture Hours.
Theories of thermodynamics and their application to more involved problems in engineering practice and design; equilibrium, Gibbs’ function, nonideal gases and various equations of state; second law analysis and statistical theory.
Prerequisite: MEEN 421 or equivalent.

MEEN 616/MSEN 616 Surface Science
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Properties of surfaces, principles of classic and contemporary surface characterization techniques, recent development and roles of surface science in advanced technology.
Prerequisite: Graduate classification.
Cross Listing: MSEN 616/MEEN 616.

MEEN 617 Mechanical Vibrations
Credits 3. 3 Lecture Hours.
Prerequisites: MEEN 364; MATH 308.

MEEN 618 Energy Methods
Credits 3. 3 Lecture Hours.
Principles of virtual work, minimum total potential energy and extremum mixed variational principles; energy theorems of structural mechanics; Hamilton’s principle for dynamical systems; Rayleigh-Ritz Galerkin, and weighted-residual methods; applications to linear and nonlinear problems in mechanics (bars, beams, frames, plates and general boundary value problems).
Prerequisites: MATH 601 or registration therein.

MEEN 619 Conduction and Radiation
Credits 3. 3 Lecture Hours.
Solutions of steady and transient problems with method of separation of variables, finite difference numerical methods, Duhane’s Theorem, Green’s function, and Laplace transform, the phase change problems. View factors; radiative properties of surfaces and participating media, radiative exchange; gas radiation; and advanced solution methods for thermal radiation.
Prerequisite: MEEN 461.

MEEN 620/MSEN 620 Kinetic Processes in Materials Science
Credits 3. 3 Lecture Hours.
Atomistic and mesoscale levels; foundation for microstructural evolution and behavior of materials; basic and irreversible thermodynamics; diffusion equations solutions; atomistic diffusion, nucleation; phase transformations: gas-solid, liquid-solid and solid-solid reactions; FiPy (finite volume solver for PDE) to simulate kinetic processes.
Prerequisites: MEEN 222 or equivalent materials science course; preliminary general thermodynamics course is not necessary.
Cross Listing: MSEN 620/MEEN 620.

MEEN 621 Fluid Mechanics
Credits 3. 3 Lecture Hours.
Dynamics of two-dimensional incompressible and compressible fluids: viscous flow in laminar and turbulent layers, the Navier-Stokes equations and boundary layer theory.
Prerequisite: MEEN 344 or equivalent.
MEEN 622 Advanced Fluid Mechanics
Credits 3.3 Lecture Hours.
Laminar viscous flows; hydrodynamic stability; transition to turbulence; special topics include atomization, two-phase flows and non-linear theories.
Prerequisites: MEEN 621 or equivalent; MATH 601 or equivalent.

MEEN 624 Two-Phase Flow and Heat Transfer
Credits 3.3 Lecture Hours.
Current status of two-phase flow and heat transfer for application to design; basic one dimensional treatment of two-phase flows and the current state of the art in liquid-vapor phase change heat transfer.
Prerequisite: Undergraduate courses in fluid mechanics and heat transfer.

MEEN 625/MSEN 625 Mechanical Behavior of Materials
Credits 3.3 Lecture Hours.
Examination of deformation and microstructure mechanisms responsible for deformation and failure in metals; fatigue, creep, and fracture mechanisms of materials; emphasis on microstructural-mechanical property relationship.
Prerequisite: Undergraduate-level materials science course.
Cross Listing: MSEN 625/MEEN 625.

MEEN 626 Lubrication Theory
Credits 3.3 Lecture Hours.
Development of Reynolds equation from Navier-Stokes equation for study of hydrodynamic lubrication theory as basis for bearing design; application to simple thrust and journal bearings and pads of various geometries; hydrostatic lubrication, floating ring bearing, compressible fluid (gas) lubrication, grease lubrication, dynamically loaded bearings, half speed whirl and stability.
Prerequisites: MEEN 344 or equivalent; MATH 308.

MEEN 627 Heat Transfer-Conduction
Credits 3.3 Lecture Hours.
Mathematical theory of steady-state and transient heat conduction; solution of the governing differential equations by analytical and numerical methods; applications to various geometric configurations.
Prerequisites: MEEN 461; MATH 601 or registration therein.

MEEN 628 Heat Transfer-Convection
Credits 3.3 Lecture Hours.
Mathematical theory of convection energy transport; applications to the design of heat transfer apparatus.
Prerequisites: MEEN 461; MATH 601 or registration therein.

MEEN 629 Heat Transfer-Radiation
Credits 3.3 Lecture Hours.
Mathematical theory of thermal radiation with design applications; ideal and nonideal radiating surfaces, heat transfer in enclosures, solar radiation; analytical, numerical and analogical methods stressed in problem solving.
Prerequisites: MEEN 461; MATH 601 or registration therein.

MEEN 630 Intermediate Heat Transfer
Credits 3.3 Lecture Hours.
Application of basic laws to the analysis of heat and mass transfer; exact and approximate solutions to conduction, convection and radiation problems; current status of single and two-phase heat transfer for application to design.
Prerequisites: Undergraduate courses in fluid mechanics and heat transfer.

MEEN 631 Microscale Thermodynamics
Credits 3.3 Lecture Hours.
An understanding of thermodynamics and transport properties from a microscopic viewpoint; principles of quantum mechanics; atomic and molecular contribution to thermodynamic properties; kinetic theory and transport properties.
Prerequisite: Graduate classification.

MEEN 632 Advanced Computer-Aided Engineering
Credits 3.3 Lecture Hours.
An integrated learning environment that is responsive to industrial need for mechanical engineers with multi-disciplinary design skills; three essentials emphasized in strong teamwork environment; design concept development, design optimization and effective communication via engineering drawings.
Prerequisite: Graduate classification in mechanical engineering.

MEEN 633 Combustion Science and Engineering
Credits 3.3 Lecture Hours.
Fuels and combustion, mass transfer, transport properties, conservation laws, droplet, particle and slurry combustion, sprays, combustion in flow systems flammability, ignition, extinction, flame stability, laminar and detonation waves, premixed flames, application to burners--residential, utility and transportation, fluidized bed combustors, and fire and flame spread of modern building materials.
Prerequisites: MEEN 421, MEEN 344, MEEN 461 or equivalents.

MEEN 634 Dynamics and Modeling of Mechatronic Systems
Credits 3.3 Lecture Hours.
Mechatronic interactions in lumped-parameter and continuum systems.
Prerequisites: MEEN 364, MATH 308, MEEN 357.

MEEN 635 Flow and Fracture of Polymeric Solids
Credits 3.3 Lecture Hours.
Relationship of molecular structure to flow and fracture in polymeric materials; introduction of viscoelastic fracture mechanics; micromechanisms of fracture including crazing; fatigue behavior of polymeric materials.

MEEN 636 Turbulence: Theory and Engineering Applications
Credits 3.3 Lecture Hours.
Characteristics, concepts, and relationships of detailed turbulent flow analysis and measurement; turbulence origin, energy production, cascade and dissipation; correlation functions, spectra and length scales; closure modeling of the Reynolds-averaged governing equations.
Prerequisites: MEEN 621.

MEEN 637 Turbulence Measurement and Analysis
Credits 3.3 Lecture Hours.
Instrumentation and measurement techniques used in turbulent flow field analysis with emphasis on understanding the characteristics of the turbulence. Pressure probes, hot-wire/hot-film anemometry, laser anemometry, spectral and temporal analysis techniques, conditional sampling and computer applications.
Prerequisite: MEEN 344.

MEEN 638 Mechanics of Non-Linear Fluids
Credits 3.3 Lecture Hours.
Introduction to classifications of flows, constitutive theory, fluids of the differential type.
Prerequisites: Graduate classification and approval of instructor.
MEEN 639 Dynamics of Rotating Machinery
Credits 3.3 Lecture Hours.
Dynamic stability, critical speeds and unbalanced response of rotor-bearing systems; special problems encountered in modern applications operating through and above critical speeds.
Prerequisites: MEEN 363 or equivalent and graduate classification or approval of the instructor.

MEEN 640/MSEN 640 Thermodynamics in Materials Science
Credits 3.3 Lecture Hours.
Use of thermodynamic methods to predict behavior of materials; codification of thermodynamic properties into simplified models; principles, methods, and models to generate accurate equilibrium maps through computational thermodynamics software; applications to bulk metallic, polymeric and ceramic materials, defects, thin films, electrochemistry, magnetism.
Prerequisites: MEEN 222 or equivalent; graduate classification. Cross Listing: MSEN 640/MEEN 640.

MEEN 641 Quantitative Feedback Theory
Credits 3.3 Lecture Hours.
Benefits of feedback and cost of feedback; understanding extent to which available design theories meet realistic design constraints; treating the synthesis problem from a quantitative viewpoint; quantitative feedback theory as an effective tool for realistic feedback design problems for multivariable systems having both minimum and non-minimum phase zeros.
Prerequisite: MEEN 651 or equivalent.

MEEN 642 Gas Turbine Heat Transfer and Cooling Technology
Credits 3.3 Lecture Hours.
Focus on the range of gas turbine heat transfer issues and associated cooling technologies; fundamentals, turbine heat transfer, turbine film cooling, turbine internal cooling with rotation, experimental methods, numerical modeling and final remarks; provide solid background for research and design in turbomachinery heat transfer.
Prerequisites: MEEN 344, MEEN 461, and graduate standing.

MEEN 643 Experimental Methods in Heat Transfer and Fluid Mechanics
Credits 3.3 Lecture Hours.
Experimental methods including experiment planning and design, mechanics of measurements, error and uncertainty analysis, standards and calibration, temperature measurement, interferometry, flow rate measurement, hot wire anemometry, subsonic and supersonic flow visualization and data analysis; selected experiments conducted.
Prerequisite: Graduate classification.

MEEN 644/NUEN 644 Numerical Heat Transfer and Fluid Flow
Credits 3.3 Lecture Hours.
Convection-diffusion, up-wind, exponential, exact solution, power law schemes, false diffusion; staggered grid concept; development of simple and simpler algorithms; periodically developed flows.
Prerequisites: MEEN 357 and MEEN 461; NUEN 430 or equivalent. Cross Listing: NUEN 644/MEEN 644.

MEEN 645 Engineering Applications of Solid Mechanics
Credits 3.3 Lecture Hours.
Mechanical and mathematical basis for modeling response of solid bodies undergoing coupled mechanical and non-mechanical effects, analysis of stress and deformation for structural members subjected to axial, torsional and bending loads, design of multifunctional systems.
Prerequisites: CVEN 305, MEEN 368, or equivalent.

MEEN 646 Aerothermodynamics of Turbomachines
Credits 3.3 Lecture Hours.
Fluid mechanics and thermodynamics as applied to the design of rotating systems; development of turbomachinery equations; detailed aerodynamic design of compressors and turbines.
Prerequisites: MEEN 414 and MEEN 472; MATH 601 or approval of instructor.

MEEN 648/ISEN 654 Manufacturing Systems Planning and Analysis
Credits 3.3 Lecture Hours.
The system perspective of a computer integrated manufacturing system; manufacturing and its various levels and the planning and control of product movement through the production system in the context of using real-time control, multiprocessor systems, network architectures and databases.

MEEN 649 Nonlinear Vibrations
Credits 3.3 Lecture Hours.
Exact and approximate solutions to nonlinear differential equations in mechanical vibrations; application of classical methods in nonlinear analysis such as the Method of Perturbations and Variation of Parameters; virtual Work Technique and the Modified Galerkin Method; applications to selected nonlinear problems.
Prerequisites: Course in differential equations; graduate classification.

MEEN 650/ISEN 655 Control Issues in Computer Integrated Manufacturing
Credits 3.3 Lecture Hours.
Examines the nature of computer aided manufacturing systems with emphasis in control; presentation of architecture for control of CAM systems; control issues; study and development of problems and procedures to control CAM systems.
Prerequisite: ISEN 654/MEEN 648 or approval of instructor. Cross Listing: ISEN 655/MEEN 650.

MEEN 651 Control System Design
Credits 3.3 Lecture Hours.
Frequency domain design of SISO systems for performance and sensitivity reduction; applications of Kalman filter and LQG/LTR techniques; design of sample-data systems; active control of vibration in distributed parameter systems; describing function and relay controls; application of control principles to engineering design.
Prerequisite: MEEN 411.

MEEN 652 Multivariable Control System Design
Credits 3.3 Lecture Hours.
Advanced issues relevant to the design of multivariable control systems using hybrid (time and frequency domain) design methodologies; design using the LQG/LTR method and advanced practical applications using various robust control system design techniques.
Prerequisite: MEEN 651 or ECEN 605.

MEEN 653 Scientific Writing
Credits 3.3 Lecture Hours.
Topics include origin and development of scientific writing, research methods, outlines, paper organization, journal selection, strategies to build a productive personal writing culture, effective communication, critical reviews and submission; preparation of an original manuscript for submission to a peer-reviewed journal by the end of the semester.
Prerequisites: Graduate classification and approval of instructor.
MEEN 655 Design of Nonlinear Control Systems  
Credits 3.3 Lecture Hours.  
Design controllers for nonlinear and uncertain systems; apply the designs to mechanical systems.  
Prerequisite: Graduate classification, MEEN 651 or equivalent.

MEEN 656/MSEN 656 Mechanical and Physical Properties of Thin Films  
Credits 3.3 Lecture Hours.  
Mechanical properties (hardness, stress, strain, delamination, fracture) of films; nanomechanical testing techniques; electrical properties of thin films; electrical properties measurement techniques; magnetic properties of films; magnetic properties measurement techniques; laboratory includes (1) thin film fabrication (sputtering, PVD); (2) nanomechanical testing; (3) electrical/magnetic measurement.  
Prerequisite: MEEN 222, MSEN 601, or basic materials science background.  
Cross Listing: MSEN 656/MEEN 656.

MEEN 657 Viscoelasticity of Solids and Structures I  
Credits 3.3 Lecture Hours.  
Linear, viscoelastic mechanical property characterization methods, time-temperature equivalence, multiaxial stress-strain equations; viscoelastic stress analysis; the correspondence principle, approximate methods of analysis and Laplace transform inversion, special methods; static and dynamic engineering applications; nonlinear behavior.  
Prerequisite: Mechanics of Materials (CVEN 305 or equiv).

MEEN 658/MSEN 658 Fundamentals of Ceramics  
Credits 3.3 Lecture Hours.  
Atomic bonding; crystalline and glassy structure; phase equilibria and ceramic reactions; mechanical, electrical, thermal, dielectric, magnetic, and optical properties; ceramic processing.  
Prerequisite: MEEN 222 or equivalent or approval of instructor.  
Cross Listing: MSEN 658/MEEN 658.

MEEN 659 Vibration Measurement in Rotating Machinery and Machine Structures  
Credits 3.3 Lecture Hours.  
Transducers, instruments, measurement techniques, data acquisition methods, data reduction methods for modal analysis, applications to rotating machines, turbomachinery rotordynamics, bearings, gears and machine foundations.  
Prerequisites: MEEN 459, MEEN 617 or MEEN 639; graduate classification.

MEEN 661/MEMA 613 Principles of Composite Materials  
Credits 3.3 Lecture Hours.  
Classification and characteristics of composite materials; micromechanical and macromechanical behavior of composite laminae; macromechanical behavior of laminates using classical laminate theory; interlaminar stresses and failure modes; structural design concepts, testing and manufacturing techniques.  
Prerequisites: CVEN 305 or equivalent.  
Cross Listing: MEMA 613.

MEEN 662 Energy Management in Industry  
Credits 3.3 Lecture Hours.  
Energy systems and components frequently encountered in industrial environments; application of basic principles of thermodynamics, heat transfer, fluid mechanics and electrical machinery to the analysis and design of industrial system components and systems. Improved energy utilization.  
Prerequisites: MEEN 421 and MEEN 461 or approval of instructor.

MEEN 663 Cogeneration Systems  
Credits 3.3 Lecture Hours.  
Design and analysis of cogeneration systems; selection of prime mover-steam turbine, gas turbine, or reciprocating engine; environmental assessments; economic and financial evaluations; legal and institutional considerations; case studies.  
Prerequisite: MEEN 421 or equivalent.

MEEN 664 Energy Management in Commercial Buildings  
Credits 3.3 Lecture Hours.  
Basic heating, ventilating and air conditioning system design/selection criteria for air conditioning and heat system and design/selection of central plant components and equipment.  
Prerequisites: MEEN 661 and MEEN 461 or approval of instructor.

MEEN 665 Application of Energy Management  
Credits 3.3 Lecture Hours.  
Continuation of MEEN 662 and 664; case studies by students of energy conservation opportunities using energy audits and building load computer simulation.  
Prerequisites: MEEN 662 and MEEN 664 or approval of instructor.

MEEN 666 Plasticity Theory  
Credits 3.3 Lecture Hours.  
Theory of plastic yield and flow of two and three-dimensional bodies; classical plasticity theories, unified viscoplastic theories, numerical considerations; applications and comparisons of theory to experiment.  
Prerequisite: MEMA 602/AERO 603, MEEN 689 or equivalent.  
Cross Listing: MSEN 641 and MEMA 641.

MEEN 667 Mechatronics  
Credits 3.2 Lecture Hours. 3 Lab Hours.  
Mechatronics; logic circuits in mechanical systems; electrical-mechanical interfacing; analysis and applications of computerized machinery.  
Prerequisite: Graduate classification in engineering.

MEEN 668 Rotordynamics  
Credits 3.3 Lecture Hours.  
Teaches the phenomena which occur in rotordynamics of turbomachinery, modeling techniques for turbomachines, and analysis techniques for rotordynamics analysis of real machines.  
Prerequisite: Graduate classification.

MEEN 672 Introduction to Finite Element Method  
Credits 3.3 Lecture Hours.  
Weak or variational formulation of differential equations governing one- and two-dimensional problems of engineering; finite element model development and analysis of standard problems of solid mechanics (bars, beams, and plane elasticity), heat transfer and fluid mechanics; time-dependent problems; computer implementation and use of simple finite element codes in solving engineering problems.  
Prerequisite: Senior or graduate classification.

MEEN 673/MEMA 648 Nonlinear Finite Element Methods in Structural Mechanics  
Credits 3.3 Lecture Hours.  
Tensor definitions of stress and strain, finite strain, geometric and material nonlinearities; development on nonlinear finite element equations from virtual work; total and updated Lagrangian formulations; solution methods for nonlinear equations; computational considerations; applications using existing computer programs.  
Prerequisites: MEMA 647/MEEN 670.  
Cross Listing: MEMA 648.
MEEN 674/ECEN 608 Modern Control
Credits 3. 3 Lecture Hours.
Vector Norms, Induced Operator Norm; Lp stability; the small gain theorem; performance/robustness tradeoffs; H1 and H00 optimal control as operator norm minimization; H2 optimal control.
Prerequisite: ECEN 605 or equivalent.
Cross Listing: ECEN 608/MEEN 674.

MEEN 675/ECEN 609 Adaptive Control
Credits 3. 3 Lecture Hours.
Basic principles of parameter identification and parameter adaptive control; robustness and examples of instability; development of a unified approach to the design of robust adaptive schemes.
Prerequisite: ECEN 605 or equivalent.
Cross Listing: ECEN 609/MEEN 675.

MEEN 676/CSCE 639 Fuzzy Logic and Intelligent Systems
Credits 3. 3 Lecture Hours.
Introduces the basics of fuzzy logic and its role in developing intelligent systems; topics include fuzzy set theory, fuzzy rule inference, fuzzy logic in control, fuzzy pattern recognition, neural fuzzy systems, and fuzzy model identification using genetic algorithms.
Prerequisite: CSCE 625 or approval of instructor.
Cross Listing: CSCE 639/MEEN 676.

MEEN 677/NUEN 677 Aerosol Science
Credits 3. 3 Lecture Hours.
Multidisciplinary survey of methods for describing aerosol particles and systems: gas kinetics and transport theory, formation and growth thermodynamics, electrical properties, coagulation, light scattering; selected topics from current literature.
Prerequisite: Graduate classification in engineering or approval of instructor.
Cross Listing: NUEN 677/MEEN 677.

MEEN 678 Aerosol Mechanics
Credits 3. 3 Lecture Hours.
Provides the basis for understanding and modeling aerosol behavior; mechanical, fluid dynamical, electrical, optical and molecular effects are considered; applications include sprays and atomization, aerosol collection, aerosol sampling and visibility.
Prerequisite: Graduate classification in engineering or approval of instructor.

MEEN 679 Spectral Methods in Heat Transfer and Fluid Flow
Credits 3. 3 Lecture Hours.
Introduces theoretical and applications aspects of spectral and multi-domain spectral methods for computational heat transfer and fluid flow problems.
Prerequisites: MEEN 357, MEEN 344, MEEN 461; graduate classification.

MEEN 681 Seminar
Credit 1. 1 Lab Hour.
Current research in a wide range of fields described by guest lecturers who are prominent in their fields. Discussion period at the end of each lecture will permit the students to learn more about the lecturer and his/her work.
Prerequisite: Graduate classification in mechanical engineering.

MEEN 684 Professional Internship
Credits 1 to 16. 1 to 16 Other Hours.
Supervised work in an area closely related to the specialized field of study undertaken by a Master of Engineering candidate.
Prerequisite: Admission to a specialized Master of Engineering program in mechanical engineering.

MEEN 685 Directed Studies
Credits 1 to 12. 1 to 12 Other Hours.
Content will be adapted to interest and needs of group enrolled.

MEEN 686/MSEN 618 Composite Materials Processing and Performance
Credits 3. 3 Lecture Hours.
Fundamental science and design; processing and design interaction regarding multiphase composites; processing science, experimental characterization, laminate analysis; design structure and process.
Prerequisite: Elasticity, continuum mechanics, or equivalent.
Cross Listing: MSEN 618/MEEN 686.

MEEN 688 Advanced Solid Mechanics
Credits 3. 3 Lecture Hours.
Derive approximate solutions of engineering mechanics problems by using suitable assumptions; understand the nature of the approximations and their effects on the accuracy of the resulting mechanics-of-materials solutions; apply the principles of advanced mechanics of materials to analyze deformation and failure problems common in engineering design and materials science; prepare for success in more advanced mechanics courses such as elasticity, energy methods, continuum mechanics and plasticity.
Prerequisite: Mechanics of materials, advanced calculus, differential equations.

MEEN 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Special topics in an identified area of mechanical engineering. May be repeated for credit.
Prerequisite: Approval of instructor.

MEEN 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Methods and practice in mechanical engineering research for thesis or dissertation.

MEEN 692 Professional Study
Credits 1 to 9. 1 to 9 Other Hours.
Approved professional study or project; may be taken more than once, but not to exceed 6 hours of credit toward a degree. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisite: Approval of instructor.

MEFB - Mid Grds Ed Field Based

Courses

MEFB 351 Introduction to Middle Grades: Adolescent Development, Philosophy and Organization
Credits 3. 2 Lecture Hours. 6 Lab Hours.
Study of young adolescents in domains of physical, social, emotional, cognitive, interpersonal, moral growth and development; organizational structure of middle schools supporting development of young adolescents through teaming and interdisciplinary work; investigates roles and responsibilities of middle level teachers.
Prerequisite: Junior classification.
MEFB 450 Social Studies Methods in the Middle Grades
Credits 3. 2 Lecture Hours. 6 Other Hours.
Trends and issues related to middle grades curriculum development and instruction in social studies and humanities; integration of content, planning, teaching-learning experiences; evaluation of teaching and learning in social studies.
Prerequisites: MEFB 352; admission to teacher education; senior classification.
Corequisites: RDNG 470 and RDNG 490.

MEFB 452 Curriculum and Instruction for Middle Grades
Credits 3. 2 Lecture Hours. 6 Other Hours.
Study of educational theory and instructional strategies appropriate to middle grades education including planning and development of interdisciplinary and multidisciplinary curricula; student centered learning and methodologies.
Prerequisites: Admission to teacher education; senior classification.
Corequisites: MEFB 452, MEFB 470, RDNG 490.

MEFB 460 Math Methods in Middle Grades
Credits 3. 2 Lecture Hours. 6 Other Hours.
Examines theories, provides practice in teaching methods essential to successful mathematics learning; focuses on content and criteria central to teaching mathematics for understanding, skill development, and problem solving; readings, discussions, analyses; modeling and practicing mathematics teaching and learning.
Prerequisites: MASC 351 and MASC 450; admission to teacher education; senior classification.
Corequisites: MEFB 452, MEFB 470, RDNG 490.

MEFB 470 Science Methods in Middle Grades
Credits 3. 2 Lecture Hours. 6 Other Hours.
Problems-based-learning course integrating science content, scientific inquiry skills and field-based instruction; technology-mediated teaching, learning, and assessment.
Prerequisites: MEFB 352; admission to teacher education; senior classification.
Corequisites: MEFB 460; MASC 450.

MEFB 497 Supervised Clinical Teaching
Credits 6. 30 Other Hours.
Culmination of teaching education program; integrate and apply knowledge and skills learned from program of study while observing and participating in accredited schools with university supervision. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisites: Admission and retention in teacher education program; successful completion of all coursework.

MEPS 316 Introduction to Theory and Practice of Plant Physiology
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Theory of plant physiology related to purposeful practices for improving plant adaptation, productivity and quality and for protecting and remediating environments in agriculture; laboratory experiments of physiology of plant structure, components and culture; water relations and stress; nitrogen and mineral nutrition; gas exchange; hormonal regulation.
Prerequisites: BIOL 101; CHEM 101; junior or senior classification.

MEFB 411/GENE 411 Biotechnology for Crop Improvement
Credits 3. 3 Lecture Hours.
Use of biotechnology to improve agricultural, horticultural and forest crops; techniques and methods used and case studies where biotechnology has been used to alter traits such as pathogen resistance, protein or oil consumption, ripening, fertility and wood properties.
Prerequisite: BIOL 113 or equivalent.
Cross Listing: GENE 411/MEPS 411.

MEFS 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Individual problems or research not covered by other coursework. Report required.
Prerequisites: Junior or senior classification and prior approval of instructor or department head.

MEFS 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of plant physiology. May be repeated for credit.

MEFS 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in molecular and environmental plant sciences. May be repeated 3 times for credit. Registration in multiple sections of this course are possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor.

MEFS 601 Physiology of Plants
Credits 3. 3 Lecture Hours.
Advanced physiology of higher plants, includes water relations, mineral metabolism, biochemistry, growth, development, hormones, environmental signals and stress physiology. Emphasis on current literature and research trends; cellular and sub-cellular mechanisms related to whole plant behavior.
Prerequisites: BICH 410 and MEFS 313 or approval of instructor.

MEFS 605 Plant Biochemistry
Credits 3. 3 Lecture Hours.
Major metabolic pathways in plant metabolism; emphasis on biochemistry unique to plants.
Prerequisites: BICH 410; MEFS 313.

MEFS 610/HORT 610 Physiological and Molecular Basis for Plant Stress Response
Credits 3. 3 Lecture Hours.
Provide the tools to understand the molecular and physiological consequences caused by environmental factors (abiotic and biotic) on plant growth and development and the mechanisms of stress adaptation to stress.
Prerequisite: MEFS 313 or equivalent.
Cross Listing: HORT 610/MEFS 610.
MEPS 618/HORT 618 Root Biology
Credits 3. 3 Lecture Hours.
Basic concepts and current topics in root-soil ecology; managed and natural ecosystems including grasslands, cropping systems and forests; role of roots in the rhizosphere, the effects of soil, nutrient and water stress and climate change in C and N cycling and carbon sequestration; participate in discussions and critique recent literature.
Prerequisite: Approval of instructor.
Cross Listing: HORT 618/MEPS 618.

MEPS 619 Plant-Associated Microorganisms
Credits 3. 3 Lecture Hours.
Basic concepts and current topics in plant-microbe interactions including the diversity of plant-associated microorganisms; the plant as a microbial environment; endophytes; microbial roles in plant nutrition and fitness; uses of microorganisms for improved plant health and sustainable agriculture; microbial roles in food safety and future challenges; discussion of current literature.
Prerequisites: Basic plant biology or plant ecology is recommended; microbiology is helpful, but not required. Cross listed with HORT 619 and MEPS 619.

MEPS 620 Plant Cell Structure and Function
Credits 3. 3 Lecture Hours.
Overview of plant cell organization, function and physiology to incorporate whole-plant processes with sub-cellular, molecular and genetic mechanisms; origin of eukaryotic cells, nuclear organization and processes, cell cycle, organelle biogenesis and inheritance, photosynthesis, endomembrane system, cell trafficking, symplast, cytoskeleton, extracellular matrix, cell wall, disease, plant microbe interaction, development and differentiation.
Prerequisites: MEPS 313 or equivalent, graduate classification, or permission of the instructor.

MEPS 650 Plant Cell Culture for Crop Improvement
Credits 3. 3 Lecture Hours. 1 Lab Hour.
Focus on techniques in plant cell culture which can be applied to all crop plants, including agronomic crops, horticulture and forestry crops for germplasm improvement.
Prerequisites: MEPS 313; CHEM 101; graduate classification.

MEPS 654 Analysis of Complex Genomes
Credits 3. 3 Lecture Hours.
History and current status of genetic and molecular analysis of higher eukaryotic genomes; coverage of techniques for dissection of genomes into manageable parts; investigations in genetics, breeding and evolution; emphasis on quantitative inheritance, genetic mapping, physical mapping, map-based cloning, with examples drawn from a wide range of organisms.
Prerequisite: GENE 603.
Cross Listing: GENE 654 and SCSC 654.

MEPS 655 Analysis of Complex Genomes—Lab
Credits 3. 7 Lab Hours.
Analysis of Complex Genomes—Lab. Laboratory methods in molecular genetic techniques for genetic mapping, physical mapping, and map-based cloning of both qualitative and quantitative phenotypes.
Prerequisite: GENE 603 or equivalent or approval of instructor.
Cross Listing: SCSC 655 and GENE 655.

MEPS 671/SCSC 671 Plant Growth and Development
Credits 3. 3 Lecture Hours.
Comprehensive analysis of plant development primarily focused on the molecular and cellular processes underlying morphogenesis, vegetative growth and reproduction; role of the major phytohormones as coordinators of development will be analyzed; plastic development responses to conditioning environmental signals.
Prerequisites: MEPS 601 or approval of instructor.
Cross Listing: SCSC 671/MEPS 671.

MEPS 681 Seminar
Credit 1. 1 Other Hour.
Professional development for students pursuing careers in plant physiology; oral and poster presentations, writing skills, grantsmanship, job search and the promotion and tenure process.

MEPS 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Individual problems or research not pertaining to thesis or dissertation.
Prerequisite: MEPS 313.

MEPS 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 1 to 4 Lab Hours.
Selected topics in an identified area of plant physiology. May be repeated for credit.
Prerequisite: Approval of instructor.

MEPS 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Original investigations in support of thesis or dissertation.

MGMT - Management

Courses

MGMT 105 Introduction to Business
Credits 3. 3 Lecture Hours.
(BUSI 1301) Introduction to Business. Survey of economic systems, forms of business ownership and running the small business; organizing and managing businesses; managing human resources; managing production and information; managing marketing; introducing financial issues and processes to small businesses; consumer and social responsibility; contemporary public policies confronting business persons examined including antitrust law, employment and discrimination law, product safety regulation, consumer protection and ethics. May not be used to satisfy degree requirements for majors in business.
Prerequisites: Sophomore classification; for students other than business and agribusiness majors.

MGMT 209 Business, Government and Society
Credits 3. 3 Lecture Hours.
Impact of the external environment—legal, political, economic and international-on business behavior; market and non-market solutions to contemporary public policies confronting business persons examined including antitrust law, employment and discrimination law, product safety regulation, consumer protection and ethics. May not be used to satisfy degree requirements for majors in business.
Prerequisites: Sophomore classification; for students other than business and agribusiness majors.
MGMT 211 Legal and Social Environment of Business
Credits 3.3 Lecture Hours.
Role of government in business and society; analysis of social policy and legal institutions; ethical problems in management decisions; administrative law; antitrust law; employment and discrimination law; regulation of business transactions; protection of property rights; regulation of information in markets including securities and product safety; international business law.
Prerequisite: Sophomore classification.

MGMT 212 Business Law
Credits 3.3 Lecture Hours.
(BUSI 2301) Business Law. Legal principles of business; legal reasoning; dispute resolution and procedure; contract law; bankruptcy law; property law; Uniform Commercial Codes sections concerning contracts, security interests, negotiable instruments and sales.
Prerequisite: Sophomore classification.

MGMT 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of business and management. May be repeated for credit.
Prerequisite: Approval of instructor.

MGMT 309 Survey of Management
Credits 3.3 Lecture Hours.
Survey for non-business majors of the basic functions and responsibilities of managers; includes the environmental context of management, planning and decision making, organization structure and design, leading and managing people, and the controlling process; issues of globalization, ethics, quality and diversity integrated throughout the course. May not be used to satisfy degree requirements for majors in business.
Prerequisites: Junior classification; for students other than business and agricbusiness majors.

MGMT 363 Managing People in Organizations
Credits 3.3 Lecture Hours.
The role and importance of human behavior in organizations; models for understanding individual, group, and team dynamics, including individual differences, motivation, and leadership; managing organizational change; ethical issues in organizations; cross-cultural issues in managing people in organizations; the organizational context as determined by human resource management and organization design.
Prerequisite: MGMT 211 and admission to upper division in Mays Business School.

MGMT 372 Advanced Concepts in Organizational Behavior
Credits 3.3 Lecture Hours.
Builds on the survey of organizational behavior in MGMT 363; review of core concepts and their application in organizational settings; includes personality and individual differences, job design, group and team dynamics, leadership and decision-making, conflict and cooperation, cross-cultural aspects of behavior in organizations.
Prerequisite: MGMT 363.

MGMT 373 Managing Human Resources
Credits 3.3 Lecture Hours.
Strategic issues in managing human resources; shared responsibilities of line managers and human resource staff for developing and implementing human resource policies and procedures; human resource planning; job design, analysis and evaluation; staffing; compensation; performance appraisal; training and development; career management; labor relations; legal, ethical and international issues.
Prerequisite: MGMT 363.

MGMT 422 Management Consulting
Credits 3.3 Lecture Hours.
The field of management consulting from the perspective of both the individual consultant and the consulting firm; fundamentals of diagnosing situations, planning and executing assignments, client management, common mistakes and ethical issues in consulting including a variety of diagnostic and problem-solving methodologies.
Prerequisite: MGMT 363.

MGMT 424 Organizational Design, Change and Development
Credits 3.3 Lecture Hours.
Aspects of effectively planning for and introducing changes in organizational structures and procedures based on environmental demands; examination of the successful management of organizational and behavioral changes, focusing on planned and unplanned changes, and emphasizing development of change strategies and measurement of change effectiveness.
Prerequisite: MGMT 363.

MGMT 425 Human Resource Selection
Credits 3.3 Lecture Hours.
Theory and application of methods for the recruitment and selection of managerial, non-professional and professional employees; exposure to scientific issues such as reliability and validity, legal issues such as equal opportunity and affirmative action, and selection techniques such as interviews and testing.
Prerequisite: MGMT 373.

MGMT 427 Human Resource Compensation
Credits 3.3 Lecture Hours.
Theories and techniques of designing and managing programs of direct compensation and benefits, including the role of rewards in motivation, job evaluation, pay discrimination and comparable worth, internal and external equity comparisons and benefit plans.
Prerequisite: MGMT 373.

MGMT 429 Labor and Industry
Credits 3.3 Lecture Hours.
Brief review of the history of organized labor; critical study of labor-management relations; analysis of fundamentals of labor contracts and administration of contract parts.
Prerequisite: Admission to upper division in Mays Business School.

MGMT 430/WGST 430 Employment Discrimination Law
Credits 3.3 Lecture Hours.
Legal issues surrounding employment discrimination, including disparate treatment and impact; intent; affirmative action; sexual harassment; pregnancy, sex, race, religious, salary, disability, age, and ethnic discrimination; policy issues and perspectives to aid human resource specialists and managers.
Prerequisites: Admission to upper division in Mays Business School and senior classification.
Cross Listing: WGST 430/MGMT 430.

MGMT 432 Managing the Nonprofit Organization
Credits 3.3 Lecture Hours.
Broad trends shaping the nonprofit sector, a primary driver of social change and key player in society and the economy that provides an array of goods and services; complex management challenges that confront nonprofits as they balance their mission and values against the requirements of effective management with limited resources.
Prerequisite: MGMT 363.
MGMT 435 Labor Law and Policy
Credits 3.3 Lecture Hours.
Federal and state public policy and laws regulating human resource management including National Labor Relations Act, Railway Labor Act, Fair Labor Standards Act, employment discrimination statutes, statutes regarding public sector unionization, and other relevant legal authorities; various forms of dispute settlement including litigation, mediation, fact finding and arbitration; legal ramifications of strategic human resource management decision making.
Prerequisites: Admission to upper division in Mays Business School and senior classification.

MGMT 439 Negotiations
Credits 3.3 Lecture Hours.
Overview of the various theories and processes of negotiation relevant to the broad spectrum of negotiation problems faced by employees and managers, and in situations outside of organizations; discovery of optimal solutions to problems and means to implement solutions through classroom simulations, role playing and case studies.
Prerequisite: MGMT 363.

MGMT 440 Creativity and Innovation in Business
Credits 3.3 Lecture Hours.
Examines factors that may foster or stifle individual, team, organizational creative performance; presents techniques that may improve creative thinking skills.
Prerequisite: MGMT 363.

MGMT 450/IBUS 450 International Environment of Business
Credits 3.3 Lecture Hours.
Broad survey of international business issues; analyzes the environment in which international businesses operate; examines international economic issues including trade theory, investment theory, foreign exchange and capital markets, and balance of payments; introduces multinational enterprises, global competition, international organizations, treaties and international law, national trade policies and the determinants of competitiveness of firms in international markets.
Prerequisite: Admission to upper division in Mays Business School. Cross Listing: IBUS 450/MGMT 450.

MGMT 452/IBUS 452 International Management
Credits 3.3 Lecture Hours.
An overview of international management to include international dimensions of organizational behavior, theory, strategy and human resource management; application of theoretical ideas to real-world situations through case analyses, presentations, projects and interactive class discussion.
Prerequisite: MGMT 450/IBUS 450 or IBUS 450/MGMT 450, or concurrent enrollment. Cross Listing: IBUS 452/MGMT 452.

MGMT 453/IBUS 453 Emerging Economies: Brazil, Russia, India, China
Credits 3.3 Lecture Hours.
Examination of present and future dynamics of the emerging economies of Brazil, Russia, India and China and their impact on the developing and developed worlds; importance of BRIC countries and their position in the world; history and development of these countries and the current business environment in each.
Prerequisite: MGMT 363. Cross Listing: IBUS 453/MGMT 453.

MGMT 457/IBUS 457 Global Entrepreneurship
Credits 3.3 Lecture Hours.
Practical issues associated with taking small- and medium-size business global; includes importing and exporting, developing global strategies, evaluating market opportunities, regional impact on economies and people.
Prerequisite: Admission to upper division in Mays Business School. Cross Listing: IBUS 457/MGMT 457.

MGMT 460 Managing Projects
Credits 3.3 Lecture Hours.
Application of management processes to complex interdisciplinary organizational environments through the study of program and project management; adoptions of traditional management theories to the project environment; master typical project management microcomputer software for project planning; resource allocation; project budgeting; and control of project cost, schedule and performance.
Prerequisite: MGMT 363.

MGMT 461 Entrepreneurship and New Ventures
Credits 3.3 Lecture Hours.
The entrepreneurial process from conception of a business idea to the actual start up of the venture; environmental scanning for new opportunities; matching individual skills and attributes with the requirements of the venture; evaluating the viability, growth potential and markets for the venture; securing financing; beginning operations.
Prerequisites: Admission to upper division in Mays Business School and senior classification.

MGMT 464 The Political Environment of Business
Credits 3.3 Lecture Hours.
Role of business in contemporary society; the large corporation and its external environment; ownership and control controversy; private and collective choice processes; role of regulation; social issues including pollution, discrimination, consumer protection, corporate social and ethical responsibilities, corporate political activity; international business relations.
Prerequisites: MGMT 363 and senior classification.

MGMT 465 Corporate Governance
Credits 3.3 Lecture Hours.
Overview of the theories and practice of corporate governance; history of corporations, role and relationship of boards of directors, shareholders and management; concepts of agency cost, shareholder activism, executive compensation and international corporate governance in globalized markets; ethical issues and corporate social responsibility.
Prerequisite: MGMT 363.

MGMT 466 Strategic Management
Credits 3.3 Lecture Hours.
Strategic issues facing organizations, including top management decision making and social responsibility; environmental and industry analysis; establishing organizational mission and objectives; corporate, business and functional level strategy formulation; global and multidomestic strategies; strategic implementation and control; integrating operations, finance, marketing and human resource strategies; case analysis.
Prerequisites: MGMT 363; FINC 341; SCMT 364; MKTG 321; senior classification.
MGMT 470 Entrepreneurial Small Business  
Credits 3. 3 Lecture Hours.  
Exploration of practical approaches to growing a small business, evaluating and projecting financial performance, raising capital, legal formations and issues, human resource management, business plan development, franchising and family business; networking opportunities with local business leaders, successful former student entrepreneurs and current student entrepreneurs operating at the student incubator.  
Prerequisites: Admission to upper division in Mays Business School and senior classification.

MGMT 475 Leadership Development  
Credits 3. 3 Lecture Hours.  
Explores the evolution of leadership theory and practice with an emphasis on effective and ineffective leaders' traits, behaviors, and styles in profit and not-for-profit work organizations; reviews critical aspects of leader role behavior from theoretical and practical perspectives; examines leader effectiveness at the individual, group, and strategic level.  
Prerequisite: MGMT 363.

MGMT 481 Seminar in Management  
Credit 1. 1 Other Hour.  
Discussions and observation of current management practice in the public and private sectors of the nation; reading and discussion of current events and changes taking place in management theory and/or its application and practice in actual business and government situations. May be repeated for credit.  
Prerequisites: Admission to upper division in Mays Business School; management major or approval of instructor.

MGMT 484 Management Internship  
Credits 1 to 4. 1 to 4 Other Hours.  
Internship in management: staffing; planning; organizing; leading and controlling. Enrollment is limited to those who have managerial responsibilities for the resources used by a business firm or the like.  
Prerequisites: Management major; MGMT 363; approval of instructor prior to internship.

MGMT 485 Directed Studies  
Credits 1 to 3. 1 to 3 Other Hours.  
Directed study on selected problems in the area of management not covered in other courses.  
Prerequisites: Admission to upper division in Mays Business School; senior classification and approval of department head.

MGMT 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified area of management. Consult the professor offering a particular special topics course for details. May be repeated for credit.  
Prerequisites: Admission to upper division in Mays Business School and approval of instructor.

MGMT 602 Markets and Public Policy  
Credits 3. 3 Lecture Hours.  
Theoretical underpinnings of business decision making; function and structure of markets; effects of public policy on business activities; includes: antitrust; securities; labor discrimination; products liability.  
Prerequisite: Graduate classification.

MGMT 610 Business and Public Policy  
Credits 3. 3 Lecture Hours.  
Role of business organizations in the United States and other countries; topics pertaining to the external political and social environment of business and the implications for business managers including market failures and political failures as well as equity and ethical issues; case studies with business/government problems.  
Prerequisite: Graduate classification.

MGMT 611 Microfoundations of Business Behavior  
Credits 1 to 3. 1 to 3 Lecture Hours.  
A multi-disciplinary analysis of the foundations of business behavior discussing business interaction with customers under alternative market conditions and interaction with suppliers, investors, employees and other stakeholders, considered in the context of alternative legal, political and social institutional arrangements. Classification 6 students may not enroll in this course.  
Prerequisites: Enrollment is limited to BUAD classification 7.

MGMT 612 Business Applications of Price Theory  
Credits 3. 3 Lecture Hours.  
Application of price theory framework to decisions facing managers. Topics include political, legal and regulatory environments of business; corporate governance and antitakeover regulations; principal-agent problems in large corporations.  
Prerequisite: Doctoral classification.

MGMT 613 Managerial Macroeconomics  
Credits 1 to 3. 1 to 3 Lecture Hours.  
Analysis of domestic and global macroeconomic issues from a managerial perspective; analysis of current and historical macroeconomic events at the national and global levels; analysis of business cycles and monetary and fiscal policies; managerial decisions in the context of changing macroeconomic environment.  
Prerequisite: Enrollment is limited to BUAD classification 7.

MGMT 614 Managing People in Organizations  
Credits 1 to 3. 1 to 3 Lecture Hours.  
Procurement and management of people in organizations including human resource management principles and analysis of how organizations function; performance appraisal, compensation, training, leadership, group dynamics, decision-making, control mechanisms and organizational change processes. Classification 6 students may not enroll in this course.  
Prerequisite: Enrollment is limited to BUAD classification 7.

MGMT 618 Corporate Strategy and the Political Environment of Business  
Credits 1 to 3. 1 to 3 Lecture Hours.  
Formulation and implementation of corporate strategy with consideration of the political environment of business. Classification 6 students may not enroll in this course.  
Prerequisites: Enrollment is limited to BUAD classification 7.

MGMT 620 Managing Human Resources  
Credits 3. 3 Lecture Hours.  
Survey of human resource management; formulation and implementation of human resource strategy addressed for areas including planning, recruitment, selection, job choice, training, development, appraisal, compensation, benefits, labor relations, international human resource issues and legal compliance.  
Prerequisite: Graduate classification.
MGMT 621 Research Methods for HR Professionals
Credits 3.3 Lecture Hours.
Direct experience in formulation of HRM issues as hypotheses and selection and implementation of appropriate research designs and statistical tools to evaluate such hypotheses; properties of appropriate criteria, measures, designs and statistical tests in context of contemporary HRM issues; ethical issues in HRM research.
Prerequisites: STAT 651 or equivalent; graduate classification.

MGMT 622 Organizational Staffing
Credits 3.3 Lecture Hours.
Foundations and operating aspects of recruitment, selection and placement in various types of organizations; coverage of scientific and legal issues affecting human resource selection decisions from a managerial perspective; examination of the usefulness of various methods used in job analysis, selection, and performance appraisal; introduction to “job match” from various perspectives.
Prerequisite: Graduate classification.

MGMT 623 Compensation Management
Credits 3.3 Lecture Hours.
Strategic and technical considerations in the management of employee compensation in organizations; including job evaluation systems, legal issues, comparable worth, rewards as a consideration in motivation and satisfaction, wage levels and structures, merit ratings, individual and group incentives and benefit plans.
Prerequisite: Graduate classification.

MGMT 624 Seminar in Human Resources
Credits 3.3 Other Hours.
Seminar on theory and research in human resource management; includes: planning, search and decision theory, organizational entry and socialization, staffing theories, validity generalization, utility theory, performance measurement and evaluation, reward systems, organizational justice and employee rights, employee development and employee withdrawal.
Prerequisite: Graduate classification or approval of instructor.

MGMT 625 Human Resource Development
Credits 3.3 Lecture Hours.
Examination of training, education and development within organizations from both a strategic and operational perspective; analysis of needs, program design and methods, program implementation and evaluation, including transfer or learning issues; legal and ethical human resource development issues; implications and practices of human resource development for enhancing global competitiveness.
Prerequisite: Graduate classification.

MGMT 626 Teams in Organizations
Credits 3.3 Lecture Hours.
Cutting edge thinking on leading in team-based organizations including the organizational changes required to move to a team-based structure and the organizational factors required to create successful work teams.
Prerequisite: Graduate classification.

MGMT 628 Contemporary Human Resource Management Issues
Credits 3.3 Lecture Hours.
Application of human resource theory to contemporary human resource management issues; impact of these issues for the organization and on the strategic role of the human resource professional; guest speakers; student projects.
Prerequisite: Second-year enrollment in the Master of Science in management program or approval of instructor.

MGMT 630 Behavior in Organizations
Credits 3.3 Lecture Hours.
Organizational behavior theory, research and applications; focuses on the individual and group levels of analysis; includes: learning principles, perceptions, attitudes and job satisfaction, work motivation, job design, group properties and processes, leadership, conflict, communication, personality influences on work attitudes and behaviors, work-life issues and job stress.
Prerequisite: Graduate classification.

MGMT 632 Technology Commercialization
Credits 3.3 Lecture Hours.
Focus on technology, process of evaluating raw technology viability, converting raw technology into commercially viable products and services; includes model on Small Business Innovation Research (SBIR) grant program; develops competencies skills to evaluate technology’s commercial viability; brings viable technologies to commercial success.
Prerequisite: Graduate classification.

MGMT 633 Organizational Change and Development
Credits 3.3 Lecture Hours.
Organizational change theory, processes and models; the role of change agents; organizational diagnosis and intervention; culture, process, strategy, structure and technology changes in organizations; evaluation research on organizational change; problems and issues in organizational change.
Prerequisite: Graduate classification.

MGMT 634 Seminar in Organizational Behavior
Credits 3.3 Other Hours.
Theory and research in organizational behavior; includes: operant and social learning theories, work motivation, job satisfaction and affect at work, task design, absenteeism and turnover, prosocial behavior, leadership, group properties and processes and work linkages and job stress.
Prerequisites: MGMT 630 or equivalent; doctoral classification or approval of instructor.

MGMT 635 Employment Regulation
Credits 3.3 Lecture Hours.
Overview of regulatory environment of human resource management; topics include: equal employment opportunity and affirmative action, benefits regulation, workplace safety, workers’ compensation, labor relations, and international aspects of employment regulation.
Prerequisite: Graduate classification.

MGMT 636 Seminar in Organization Theory
Credits 3.3 Lecture Hours.
Research literature in organization theory focusing on major theoretical perspectives and content areas; includes: design of organizational structure and control systems; analysis or organization-environment relations, including interorganizational relationships; managing organizational technology and innovation; information processing and decision making; and organizational culture, conflict and power.
Prerequisite: Doctoral classification or approval of instructor.

MGMT 637 Foundations of Entrepreneurship
Credits 3.3 Lecture Hours.
Process of launching a new venture; process by which opportunities can be discovered and selected; attributes of entrepreneurs and new venture teams; process of developing business plan; core entrepreneurial strategies--business level, organizational design, marketing, financial; strives to develop competencies, concepts, operational tools relevant to creating, implementing new ventures.
Prerequisite: Graduate classification.
MGMT 638 Strategic Entrepreneurship
Credits 1 to 3. 1 to 3 Lecture Hours.
Emphasis on a firm's need to be both entrepreneurial (identifying opportunities in the market) and strategic (taking actions to gain a competitive advantage) in order to create value for stakeholders; includes: developing an entrepreneurial mindset; building an entrepreneurial culture; managing resources (building a resource portfolio, bundling resources to create capabilities and leveraging the capabilities to exploit the opportunities identified); creating innovations.
Prerequisite: Graduate classification.

MGMT 639 Negotiations in Competitive Environments
Credits 1 to 3. 1 to 3 Lecture Hours.
Understanding prescriptive and descriptive negotiation theory as it applies to dyadic and multi-party negotiations, to buyer-seller transactions, dispute resolution, development of negotiation strategy and management of integrative and distributive aspects of the negotiation process.
Prerequisite: Graduate classification.

MGMT 640 Managing for Creativity and Innovation
Credits 3. 3 Lecture Hours.
Examines factors that may foster or stifle individual, team, or organizational creative performance, and presents techniques that may improve the student's creative thinking skills.
Prerequisite: Graduate classification.

MGMT 643 Foundations of Managerial Law
Credits 3. 3 Lecture Hours.
Basic legal relationships and issues encountered by managers and organizations; American legal system, administrative law, alternative dispute resolution and selected substantive areas of law (e.g., environmental protection, discrimination, negotiable instruments).
Prerequisite: Graduate classification.

MGMT 645 Legal and Ethical Issues in Business
Credits 1 to 3. 1 to 3 Lecture Hours.
An overview of legal compliance programs, business ethics and social responsibility issues.
Prerequisite: Approval of instructor.

MGMT 650 Human Relations and Collective Bargaining in Industry
Credits 3. 3 Lecture Hours.
Labor management relationship and human relations problems encountered during union administration; labor history; basic construction of the National Labor Relations Act; alternative dispute resolution; contemporary labor relations issues; international labor relations issues.
Prerequisite: Graduate classification.

MGMT 655 Survey of Management
Credits 3. 3 Lecture Hours.
Management concepts and applications important to managers in all types and sizes of organizations; includes: strategic planning, goal setting, control and managerial ethics; decision making, organizing, human resource management, including staffing, performance appraisal and compensation; leadership, motivation, communication and group processes; achieving organizational quality and managing in a global environment.
Prerequisite: Graduate classification. Note: Course may not be used for elective credit by a master's candidate in business administration.

MGMT 658 Managing Projects
Credits 3. 3 Lecture Hours.
Application of management processes to complex interdisciplinary organizational environments through the study of program and project management; adoptions of traditional management theories to the project environment; master typical project management microcomputer software for project planning; resource allocation; project budgeting; and control of project cost, schedule and performance.
Prerequisite: Graduate classification.

MGMT 660 Global Human Resource Management
Credits 3. 3 Lecture Hours.
Examine HRM in a global context; emphasis given to global HR functions such as international staffing, training, and compensation; focus on global HRM trends and challenges; addresses issues and choices HR managers face in multinational enterprises.
Prerequisite: Graduate classification.

MGMT 663/INTA 663 International Transfer Pricing
Credits 3. 3 Lecture Hours.
Valuation of cross-border transactions between units of a multinational enterprise; includes internal and external motivations for transfer pricing, managerial and economic approaches, estimates of transfer manipulation, arm's length standard, U.S. and OECD rules and procedures, tax court cases, and ethical dilemmas.
Prerequisite: Graduate classification.
Cross Listing: INTA 663/MGMT 663.

MGMT 667/IBUS 667 Multinational Enterprises
Credits 3. 3 Lecture Hours.
Graduate seminar in international business; multinational enterprises (MNEs) are studied from various perspectives including economics, management, entry and expansion strategies, contractual agreements, transfer pricing, impacts on home and host countries, MNE-state relations, regional integration, public policies towards MNEs.
Prerequisite: Graduate classification.
Cross Listing: IBUS 667/MGMT 667.

MGMT 673 Advanced Research Methods in Management
Credits 3. 3 Lecture Hours.
Introduces PhD students in Management to the multivariate methods commonly used in management research. Applications emphasized; journal publications; projects and critiques required.
Prerequisite: STAT 608.

MGMT 675 Leadership in Organizations
Credits 1 to 3. 1 to 3 Lecture Hours.
Review of research on procedures, styles and methods of leadership, supervision, management and administration; all aspects of leader role behavior, both in practice and in research; areas in need of further research. May be repeated for up to 3 hours credit.
Prerequisite: Graduate classification.

MGMT 676 Strategic Management Survey
Credits 3. 3 Lecture Hours.
Management concepts and applications important to strategy; includes: concept of strategy; the environment, and performance; the role of top management teams; business-level strategies; competitive strategy and dynamics; corporate strategy formulation and implementation; mergers; acquisitions; governance and control systems; international strategies; cooperative strategies; technology strategies; corporate entrepreneurship.
Prerequisite: Doctoral classification or approval of instructor.
MGMT 677 Strategy Implementation
Credits 3. 3 Lecture Hours.
Concepts, research and applications regarding issues central to strategy implementation; includes: the nature of managerial work; inertia, organizational change and adaptation; innovation; strategic leadership; power; top management teams in implementation roles; organizational cultures; the relationship between strategy and structure; executive succession; institutional contexts; governance; agency theory; boards of directors; executive compensation; use of leverage and cash flow; implementation of mergers, acquisitions, and restructuring.
Prerequisite: Doctoral classification or approval of instructor.

MGMT 678/IBUS 678 International Management
Credits 3. 3 Lecture Hours.
Survey of the issues, problems, challenges and opportunities facing organizations competing in a global economy; includes: the environment of international management, international strategies, forms of organization design used by multinational firms, managing human resources in an international context, and cultural and control issues facing the international manager.
Prerequisite: Graduate classification.
Cross Listing: IBUS 678/MGMT 678.

MGMT 679/IBUS 679 International Business Policy
Credits 3. 3 Lecture Hours.
Determinants of U.S. competitiveness in international markets; the international environment of business; introduction to multinational enterprises, global competition, international organizations, protection of intellectual property; international trade regulation; strategic trade theory.
Prerequisite: Graduate classification.
Cross Listing: IBUS 679/MGMT 679.

MGMT 680 Business and Corporate Strategy
Credits 3. 3 Lecture Hours.
Prerequisite: Graduate classification.

MGMT 681 Seminar
Credit 1. 1 Lecture Hour.
Critical examination of subject matter presented in current journals, monographs and bulletins in field of management. Classification 6 students may not enroll in this course.
Prerequisite: Graduate classification.

MGMT 684 Professional Internship
Credits 1 to 6. 1 to 6 Other Hours.
Directed internship in an organization to provide students with on-the-job training with professionals in organizational settings appropriate to the students' professional objectives. Classification 6 students may not enroll in this course.
Prerequisites: Approval of MS program coordinator and department head.

MGMT 685 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Directed study on selected problems using recent developments in business research methods. Classification 6 students may not enroll in this course.
Prerequisites: Graduate classification and approval of instructor.

MGMT 686 Research Methods in Organizational Science II
Credits 3. 3 Lecture Hours.
Continuation of topics introduced in Management 687; additional topics include survey research methodology, quantitative and qualitative field methods; archival data collection; measurement and methods across time; issues in peer review and publication.
Prerequisites: Doctoral classification and MGMT 687 or approval of instructor.

MGMT 687 Research Methods in Organizational Science I
Credits 3. 3 Lecture Hours.
Philosophy of science, theory development; survey of research methodology applicable to the study of organizational phenomena; research strategy and design; measurement and sampling issues; data collection methods; problems and issues in organizational research.
Prerequisites: Doctoral classification or approval of instructor; STAT 651 or equivalent.

MGMT 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of management. May be repeated for credit.
Prerequisite: Graduate classification.

MGMT 690 Theory of Research in Management
Credits 3. 3 Lecture Hours.
Research practicum; application of research methodology learned in MGMT 687; advanced readings in research methods; fundamental skills and concepts needed to design and conduct dissertation research. Classification 6 students may not enroll in this course.
Prerequisites: Doctoral classification or approval of instructor; MGMT 687 or equivalent.

MGMT 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research for thesis or dissertation. Classification 6 students may not enroll in this course.
Prerequisite: Graduate classification.

MICR - Microbiology

Courses
MICR 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of microbiology. May be repeated for credit.
Prerequisite: Approval of instructor.

MICR 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Active research of basic nature under the supervision of a Department of Biology faculty member.
Prerequisites: Freshman or sophomore classification and approval of instructor.

MICR 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of microbiology. May be repeated once for credit.

MICR 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Active research of basic nature under the supervision of a Department of Biology faculty member.
Prerequisites: Junior or senior classification and approval of instructor.
MICR 681 Seminar
Credit 1. 1 Other Hour.
Detailed reports on specific topics in field chosen. Students may register in up to but no more than three sections of this course in the same semester.

MICR 685 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Limited investigations in fields other than those chosen for thesis or dissertation.

MICR 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of microbiology.

MICR 691 Research
Credits 1 to 12. 1 to 12 Other Hours.
Research for thesis or dissertation.

MKTG - Marketing

Courses

MKTG 321 Marketing
Credits 3. 3 Lecture Hours.
Exploration of the activities and managerial decisions involved in the provision of products to customers; includes strategic marketing fundamentals, buyer behavior, market segmentation, managerial issues related to the marketing mix (product, pricing, distribution, and promotion) decision variables, and social and ethical issues.
Prerequisite: Admission to upper division in Mays Business School.

MKTG 322 Consumer Behavior
Credits 3. 3 Lecture Hours.
Application of behavioral science designed to provide in-depth knowledge of the fundamental theories and concepts of consumer behavior, with an emphasis on consumers in the marketplace as individuals, as decision makers, and as influenced by culture.
Prerequisite: MKTG 321.

MKTG 323 Marketing Research
Credits 3. 3 Lecture Hours.
Nature and uses of marketing research in business; methods of collecting, analyzing and interpreting data needed for business decisions, with specific application to problems in marketing.
Prerequisites: MKTG 321; SCMT 303 or AP STAT 301 or AP STAT 302 or AP STAT 303.

MKTG 325 Retailing Concepts and Policies
Credits 3. 3 Lecture Hours.
Survey of the concepts, policies, theories, and practices for managing a retail firm in a competitive environment; topics include functions of retailers, retail customers, supply chain, legal and ethical behavior, location analysis, pricing, promotion, customer services, and layout.
Prerequisite: MKTG 321.

MKTG 326 Strategic Retailing
Credits 3. 3 Lecture Hours.
Retail strategies such as channels of distribution, private labels, customer service levels, visual presentation, pricing, and marketing mix that influence a retail business model.
Prerequisite: MKTG 321.

MKTG 335 Professional Selling
Credits 3. 3 Lecture Hours.
General principles of personal selling in both consumer and industrial markets plus specialty selling.
Prerequisite: MKTG 321.

MKTG 345 Social Media and Public Relations
Credits 3. 3 Lecture Hours.
Marketing and promotional strategy related to social media, the internet and interactive media; managing publicity and public relations with a wide variety of stakeholders.
Prerequisite: MKTG 321.

MKTG 347 Advertising and Creative Marketing Communications
Credits 3. 3 Lecture Hours.
Advertising and integrated marketing communications; market segmentation and targeting; development of multi-media campaigns; emphasis on enhancing creativity, critical thinking, and communication skills.
Prerequisite: MKTG 321.

MKTG 401/IBUS 401 Global Marketing
Credits 3. 3 Lecture Hours.
Survey of the aspects involved in marketing goods and services in a global marketplace; social, political, legal, and economic issues associated with conducting business globally.
Prerequisite: MKTG 321.
Cross Listing: IBUS 401/MKTG 401.

MKTG 402/IBUS 402 International Marketing: Study Abroad
Credits 3. 3 Lecture Hours.
Introduction to the facets of doing business in an international setting; provides exposure to a variety of foreign cultures; facilitates understanding of the international marketplace in which these students will function.
Prerequisites: MKTG 321 or MKTG 409; junior classification; 2.5 GPR overall.
Cross Listing: IBUS 402/MKTG 402.

MKTG 403/IBUS 403 International Market Entry Strategies
Credits 3. 3 Lecture Hours.
A research-based course in which students prepare an analysis of a country, or region outside the U.S., and use it in the preparation of a marketing plan for a good or service to be introduced and marketed in that country.
Prerequisites: MKTG 321 or MKTG 409; concurrent registration in IBUS 402/MKTG 402 or MKTG 402/IBUS 402; junior or senior classification.
Cross Listing: IBUS 403/MKTG 403.

MKTG 404 Advanced Excel for Marketing Managers
Credit 1. 1 Lecture Hour.
Hands-on practice and application of the Excel skills needed for marketing decision-making.
Prerequisites: MKTG 323.

MKTG 409 Principles of Marketing
Credits 3. 3 Lecture Hours.
Survey of the basic concepts and decisions associated with product, promotion, distribution, and pricing; focuses on developing marketing strategies that contribute to building long-term customer relationships and achieving the organization’s objectives. May not be used to satisfy degree requirements for a major in business.
Prerequisites: Junior classification; for students other than business and agribusiness majors.

MKTG 425 Retail Merchandising
Credits 3. 3 Lecture Hours.
Theories, concepts and practices relating to the merchandising of products for enhancing sales and profit growth of retail businesses; emphasis on retail math, purchasing decisions, vendor negotiations, communications skills, assortment planning and competitive analysis.
Prerequisite: MKTG 321.
MKTG 426 Advanced Retail Case Study
Credits 3.3 Lecture Hours.
Problems and opportunities faced by retailing organizations; development of an effective strategy through application-oriented seminars and activities, interaction with industry guest speakers and executives; analysis of retail strategies in field settings and completion of a semester-long retail audit; participation in a national case competition.
Prerequisites: Admission to upper division in Mays Business School and approval of instructor.

MKTG 430 Marketing Consulting
Credits 3.3 Lecture Hours.
Consulting tools and techniques, managing client relationships, preparing reports and presentations, problem-solving processes; semester-long client project.
Prerequisites: MKTG 323.

MKTG 431 Marketing Analytics
Credits 3.3 Lecture Hours.
Data driven marketing strategy, data handling and management techniques, use of statistical software to estimate marketing models, project-based course focused on marketing decision making.
Prerequisite: MKTG 321.

MKTG 432 Corporate Social Responsibility
Credits 3.3 Lecture Hours.
Study of the role of corporate social responsibility, corporate governance and business ethics with an emphasis on the marketing perspective.
Prerequisites: MKTG 321.

MKTG 435 Advanced Selling
Credits 3.3 Lecture Hours.
In-depth strategic account planning, extensive role-play and team selling exercises, sales analytics, networking and prospecting, strategic goal setting and time management.
Prerequisites: MKTG 355.

MKTG 436 Sales Management
Credits 3.3 Lecture Hours.
Ethical planning, organizing, staffing, training, motivating and evaluating salespeople.
Prerequisite: MKTG 321.

MKTG 438 Strategic Digital Marketing
Credits 3.3 Lecture Hours.
Implications of the internet and related digital technologies for marketing; evolution of the digital marketplace and impact on firms' marketing mix decisions; competitive advantage; public policy issues; future trends and developments.
Prerequisite: MKTG 321.

MKTG 440 Services Marketing
Credits 3.3 Lecture Hours.
Focuses on the unique challenges of managing a service-based business; delivering quality service to customers and building strong customer relationships; applicable to for-profit and not-for-profit organizations that depend on service excellence for competitive advantage.
Prerequisite: MKTG 321.

MKTG 442 Innovation and Product Management
Credits 3.3 Lecture Hours.
Opportunity identification, concept generation, concept and program evaluation, development and launch of the various types of new products; specific topics include creativity, design, launch and management of new products.
Prerequisite: MKTG 321.

MKTG 444 Account Planning and Research
Credits 3.3 Lecture Hours.
Concepts in account planning; gathering and analyzing data (database analysis, focus groups, interviews, surveys); compilation of research into a situation analysis and creative brief for use in a national advertising case competition.
Prerequisites: MKTG 321, approval of instructor.

MKTG 447 Advanced Advertising: Case Competition
Credits 3.3 Lecture Hours.
Development of a fully integrated, multi-million dollar budgeted advertising campaign plan; participation in a national case competition.
Prerequisite: MKTG 321; approval of instructor.

MKTG 448 Marketing Strategy
Credits 3.3 Lecture Hours.
Marketing decision-making and strategies in case situations; integration of product, pricing, distribution, and promotion considerations for the purposes of determining and evaluating the optimal marketing strategy.
Prerequisite: MKTG 323; graduating marketing senior.

MKTG 448 Marketing Internship
Credits 3.3 Other Hours.
Directed internship of at least 300 hours of work under the supervision of a marketing professional providing students with on-the-job training that advances their career objectives; emphasis on business communication and personal professional development.
Prerequisites: Marketing major; MKTG 321; approval of instructor prior to internship.

MKTG 485 Directed Studies
Credits 1 to 3.1 to 3 Other Hours.
Directed study of selected problems in the area of marketing not covered in other courses.
Prerequisites: MKTG 321; approval of department head; 2.5 GPR in major and overall.

MKTG 489 Special Topics in...
Credits 1 to 4.1 to 4 Lecture Hours.1 to 4 Lab Hours.
Selected topics in an identified area of marketing. May be repeated once for credit.
Prerequisites: Admission to upper division in Mays Business School and approval of instructor.

MKTG 613 Marketing Management
Credits 1 to 3.1 to 3 Lecture Hours.
Core MBA marketing class examines history of marketing, environment that impacts marketing decisions of firms and consumers, buyer behavior, marketing ethics, marketing research, market segmentation, product positioning, new product management, and strategic challenges associated with integrating major marketing mix decision elements; product, price, distribution, and promotion. May be repeated for up to 3 hours of credit. Classification 6 students may not enroll in this course.
Prerequisite: Enrollment is limited to BUAD classification 7.

MKTG 621 Survey of Marketing
Credits 3.3 Lecture Hours.
Marketing concepts and decisions associated with developing marketing strategies; topics include product, pricing, distribution, and promotion. Note: Course may not be used for elective credit by a master's candidate in business administration.
MKTG 625 Marketing Engineering
Credits 3. 3 Lecture Hours.
Analysis and management of popular statistical packages for the purpose of enhanced data-based and empirically-driven marketing decisions. Application of statistical software to marketing-related data sets.
Prerequisite: MKTG 621 or equivalent.

MKTG 635 Marketing Analytics and Pricing
Credits 3. 3 Lecture Hours.
Advanced quantitative techniques and analytical tools that provide insights into the nature of consumer demand and its response to changes in the marketing mix, with a focus on pricing.
Prerequisite: MKTG 625.

MKTG 638 Strategic Foundations of E-Commerce
Credits 3. 3 Lecture Hours.
Implications of increasing electronic interactivity between consumers and firms; migration of products to the electronic marketplace and its effects on the marketing channel; Internet's impact on marketing mix decisions; competitive advantage; public policy issues.
Prerequisite: MKTG 613 or MKTG 621 or equivalent.

MKTG 650 Analyzing Consumer Behavior
Credits 3. 3 Lecture Hours.
Concepts, theories, and techniques applicable to obtaining a sophisticated and empirically-based understanding of consumer motivation, attitudes, decision-making processes, and responses to marketers' actions; application of consumer psychology and behavioral decision making to managerial and public policy insights.
Prerequisite: MKTG 613 or MKTG 621 or equivalent.

MKTG 656 Branding and Marketing Communication
Credits 3. 3 Lecture Hours.
Customer-based brand equity and positioning, brand objectives, communication processes, customer decision stages, creative and media strategies including traditional, grassroots, and social media, measuring advertising effectiveness and return on marketing investment.
Prerequisite: MKTG 613 or MKTG 621 or equivalent.

MKTG 660 Marketing Consulting
Credits 3. 1 Lecture Hour. 4 Lab Hours.
Application of marketing knowledge through the planning and execution of marketing projects for businesses. May be repeated one time for credit.
Prerequisite: MKTG 621 or equivalent.

MKTG 665 Research for Marketing Decisions
Credits 3. 3 Lecture Hours.
Methodology for generating and using information related to problems in marketing decision-making; primary and secondary research methodology and analytical techniques; guidelines for designing and conducting research projects. Classification 6 students may not enroll in this course.
Prerequisites: MKTG 613 or MKTG 621 or equivalent; basic statistics course.

MKTG 670 Marketing Leadership
Credit 1. 1 Lecture Hour.
Seminar on the application of marketing concepts and theories through guest lectures and discussions with marketing-thought leaders in business and academia. May be repeated one time for credit.
Prerequisite: MKTG 621 or equivalent.

MKTG 671 Product Innovation
Credits 3. 3 Lecture Hours.
Strategy and management of the new product development process, portfolio management and innovation charters for new products; topics include creativity, trade-off analysis, concept testing, design and launch.
Classification 6 students may not enroll in this course.
Prerequisite: MKTG 613 or MKTG 621 or equivalent.

MKTG 673 Services Marketing
Credits 3. 3 Lecture Hours.
Marketing concepts and strategy as applied to service organizations, unique characteristics of services, marketing challenges posed by those characteristics and ways to meet those challenges effectively. Special emphasis on service quality. Classification 6 students may not enroll in this course.
Prerequisite: MKTG 613 or MKTG 621 or equivalent, or approval of instructor.

MKTG 675 Marketing Strategy
Credits 1 to 3. 1 to 3 Lecture Hours.
Marketing management as it relates to overall organizational goals: marketing strategy concepts and interdependencies with strategy at the corporate and business unit levels and in other functional areas; impact of digital technologies and environmental sustainability on marketing strategy. Classification 6 students may not enroll in this course.
Prerequisites: MKTG 613 or MKTG 621 or equivalent.

MKTG 677/IBUS 677 Multinational Marketing Management
Credits 3. 3 Lecture Hours.
Theoretical and empirical materials on multinational marketing; nature and justification of international trade, analysis of environments faced by multinational firms and formulation of multinational marketing strategy. Classification 6 students may not enroll in this course.
Prerequisite: MKTG 613 or MKTG 621 or equivalent.
Cross Listing: IBUS 677/MKTG 677.

MKTG 680 Seminar in Buyer Behavior
Credits 3. 3 Lecture Hours.
Detailed examination of the literature in consumer and industrial buyer behavior with emphasis on conceptual and empirical issues; critical analysis of buyer behavior theory. Classification 6 students may not enroll in this course.
Prerequisites: MKTG 650 or equivalent; doctoral classification.

MKTG 682 Seminar in Marketing Strategy Research
Credits 3. 3 Lecture Hours.
Review of research on marketing strategy content; formulation process and implementation related issues; includes antecedents, outcomes, mediators and moderators of the relationship between marketing strategy and performance; strategic marketing alliances; market pioneering; multimarket competition; global competitive strategy; interdependencies between marketing, business and corporate strategy. Classification 6 students may not enroll in this course.
Prerequisite: Doctoral classification.

MKTG 684 Professional Internship
Credits 1 to 6. 1 to 6 Other Hours.
Directed internship in an organization to provide students with on-the-job training with professionals in organizational settings appropriate to the students' professional objectives. Classification 6 students may not enroll in this course.
Prerequisite: Approval of committee chair and department head.
MKTG 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed study of selected problems using recent developments in business research methods. Classification 6 students may not enroll in this course.
Prerequisite: Approval of instructor.

MKTG 687 Seminar in Marketing Models
Credits 3. 3 Lecture Hours.
Review and discussion of the foundations of modeling and recent developments in research using marketing models. The seminar is designed to provide participants with new ways to think about modeling marketing phenomena and enable them to generate new ideas, research topics, and modeling applications for marketing problems.
Prerequisite: Doctoral classification.

MKTG 688 Doctoral Seminar
Credits 3. 3 Other Hours.
Historical development of the conceptual framework of marketing theory and practices; analysis of current research and controversial issues in the field. May be repeated for credit three times. Students may take up to two sections of this course in the same semester. Classification 6 students may not enroll in this course.
Prerequisite: Doctoral classification.

MKTG 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of marketing. Classification 6 students may not enroll in this course. May be repeated for credit.

MKTG 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research for thesis or dissertation. Classification 6 students may not enroll in this course.

MLSC - Military Science

Courses

MLSC 121 Introduction to the United States Army I
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Introduction to the United States Army and the Army Reserve Officer Training Corps (ROTC); its purpose in the Army and its advantages; Army customs, courtesies, traditions, and Army values; Army history and individual soldier skills with an emphasis on leadership; includes a leadership laboratory.

MLSC 122 Introduction to the United States Army II
Credits 2. 1 Lecture Hour. 3 Lab Hours.
The second half of an introductory two-semester survey of the United States Army; principles of leadership, Army history, management theory and individual soldier skills; emphasis on critical thinking and problem solving skills; foundation for tactical and leadership concepts; includes a leadership laboratory.

MLSC 221 Tactics and Leadership Theory I
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Dimensions of creative and innovative leadership strategies through team dynamics and leadership theories that form the basis of the Army leadership framework (trait and behavior theories); infantry tactics, techniques and procedures; includes a leadership laboratory.

MLSC 222 Tactics and Leadership Theory II
Credits 3. 2 Lecture Hours. 3 Lab Hours.
The second half of a two-semester survey on leadership theory and infantry tactics; emphasis on leading tactical teams in a complex environment; Army planning and orders process; adaptive leadership styles in the context of military operations; case studies on the importance of teamwork and tactics in real-world scenarios; includes a leadership laboratory.

MLSC 321 Adaptive Leadership and Tactical Operations I
Credits 3. 3 Lecture Hours. 1 Lab Hour.
Theoretical and practical application of adaptive leadership as it relates to planning, executing and evaluating complex tactical operations; ability to assess risk, ethical decision-making, managing people and critical thinking skills in a tactical environment; includes a leadership laboratory.

MLSC 322 Adaptive Leadership and Tactical Operations II
Credits 3. 3 Lecture Hours. 1 Lab Hour.
The second half of a two-semester survey on adaptive leadership and tactical operations; ethical decision-making, planning, executing and evaluating military operations at a tactical level; preparation to attend the Leadership, Development and Assessment Course (LDAC) for the Army's commissioning process; includes a leadership laboratory.

MLSC 421 The Army Officer and the Profession of Arms I
Credits 3. 3 Lecture Hours. 1 Lab Hour.
Advanced study, research and practical application of Army training, operations and doctrine; the military as a profession, functioning as a member of a staff, and officership; law of land warfare, principles of war, and rules of engagement and their application; duties and responsibilities of a Second Lieutenant in the United States Army; includes a leadership laboratory.

MLSC 422 The Army Officer and the Profession of Arms II
Credits 3. 3 Lecture Hours. 1 Lab Hour.
The second half of a two-semester survey on adaptive leadership and tactical operations; ethical decision-making, planning, executing and evaluating military operations at a tactical level; preparation to attend the Leadership, Development and Assessment Course (LDAC) for the Army's commissioning process; includes a leadership laboratory.

MLSC 485 Directed Studies
Credits 1 to 3. 1 to 3 Other Hours.
Directed study of problems in the field of military science.
Prerequisite: Junior or senior classification with approval of department head.

MLSC 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified field of military science. May be repeated for credit.

MLSC 491 Research
Credits 1 to 4. 1 to 4 Lecture Hours.
Research conducted under the direction of a faculty member in military science. May be taken three times for credit.
Prerequisite: Junior or senior classification or approval of instructor.

MMET - Mfg & Mech Engr Tech


Courses

MMET 181 Manufacturing and Assembly Processes I
Credits 3. 2 Lecture Hours. 3 Lab Hours.
A survey of metal manufacturing processes; traditional machining, non-traditional machining, welding, fabrication, casting and assembly.
Prerequisite: Grade of C or better in ENGR 111 and ENGR 112.
Corequisite: ENDG 105.

MMET 206 Nonmetallic Materials
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Introduction to structure, properties and application of forest products, plastics, ceramics and composites; laboratory includes processing, physical and mechanical testing, applications, surface treatment and material identification.
Prerequisite: CHEM 102 or CHEM 107 with a grade of C or better; manufacturing and mechanical engineering technology or industrial distribution major or approval of department.

MMET 207 Metallic Materials
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Introduction to structure, properties and engineering application of ferrous and nonferrous materials; beneficition, production of ferrous and nonferrous metals, destructive and nondestructive testing, protective coatings, strengthening and heat treatment; laboratory includes metallurgical procedures, mechanical testing, heat treatment, surface treatment, corrosion testing, recrystallization and failure analysis.
Prerequisite: CHEM 102 or CHEM 107 with a grade of C or better; manufacturing and mechanical engineering technology or industrial distribution major or approval of department.

MMET 275 Mechanics for Technologists
Credits 4. 4 Lecture Hours.
Forces, moments and couples in 2-D and 3-D systems; equilibrium of rigid bodies; friction and applications; centroids and moments of inertia; review of particle dynamic principles; kinematics and kinetics of rigid bodies; principles of impulse-momentum and workenergy; computer use in selected areas.
Prerequisites: Grade of C or better in MATH 152 and PHYS 218; manufacturing and mechanical engineering technology major or approval of department.

MMET 281 Manufacturing and Assembly Processes II
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Continuation of MMET 181. Economics and manufacturability in polymer molding processes; assembly (fits and tolerances); compatibility of metallic and non-metallic discrete parts.
Prerequisites: Grade of C or better in MMET 181 and MMET 206; manufacturing and mechanical engineering technology major or approval of department.

MMET 303 Fluid Mechanics and Power
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Fluid mechanics and fluid power applications for technologists; fluid properties; conservation of energy and momentum; incompressible flow in pipes; standard symbols: components and control of hydraulic systems and pneumatic systems.
Prerequisites: MMET 275, ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, PHYS 218 with a grade of C or better.

MMET 313 Industrial Welding Processes
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Theory and practical applications of industrial welding and cutting processes; experience in operation of various machines and processes.
Prerequisites: Grade of C or better in MMET 181 and MMET 207 and MMET 376; grade of C or better in ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218; junior or senior classification in manufacturing and mechanical engineering technology major.

MMET 320 Quality Assurance
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Applied statistical process control and design-of-experiment techniques for quality improvement and process characterization; emphasis on organizations operating in a continuous-improvement, customer-driven environment; statistical thinking; control charts; capability analysis of product, process and measurement system; experimental process characterization, prediction models and input variable control.
Prerequisites: STAT 211 with a grade of C or better; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; junior or senior classification in manufacturing and mechanical engineering technology.

MMET 361 Product Design and Solid Modeling
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Design processes and methodologies including quality function deployment, materials and process selection, and design for manufacturing and assembly; fundamentals of modeling part geometry and mechanical assembly using parametric CAD software.
Prerequisites: Grade of C or better in MMET 181, MMET 206, MMET 207 and MMET 275; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; junior or senior classification in manufacturing and mechanical engineering technology.

MMET 363 Mechanical Design Applications I
Credits 3. 3 Lecture Hours.
Principles of design of mechanical components; theories of failure; Soderberg and Goodman diagrams; fatigue and fracture design criteria; materials and their selection to engineering applications; component assembly aspects; design of fasteners and springs as examples.
Prerequisites: MMET 376 with a grade of C or better; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; junior or senior classification in manufacturing and mechanical engineering technology.

MMET 370 Thermodynamics for Technologists
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Thermal and mechanical energy transformations; relationships applied to flow and non-flow processes in power and refrigeration cycles; devices include compressors, turbines, heat exchangers, nozzles, diffusers, pumps and piston-cylinder models; computer modeling.
Prerequisites: PHYS 218 with a grade of C or better; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117; and PHYS 218 with a grade of C or better; junior or senior classification in manufacturing and mechanical engineering technology.

MMET 376 Strength of Materials
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Stress and strain; elastic moduli Poisson's ratio; torsion, bending, unsymmetrical bending; design of beams and shafts; deflection of beams; buckling of columns; material and strength characterization laboratory tests.
Prerequisites: Grade of C or better in MMET 207 and MMET 275; completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C or better; junior or senior classification in manufacturing and mechanical engineering technology.
MMET 380 Computer-Aided Manufacturing
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Basic concepts in computer-aided manufacturing with emphasis on a
system approach to manufacturing activities; use of numerical control
machine tools and other computer based software as applied to different
industries.
Prerequisites: Grade of C or better in MMET 181 and MATH 152;
completion of ENGL 104, MATH 151, CHEM 107 and CHEM 117, and
PHYS 218 with a grade of C or better; junior or senior classification in
manufacturing and mechanical engineering technology.

MMET 383 Manufacturing Information Systems
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Use of information technology for manufacturing enterprise applications,
including computer-integrated manufacturing, database, computer
networking, web-technology and enterprise resource planning.
Prerequisites: MMET 380 with a grade of C or better; completion of
ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM 117, and
PHYS 218 with a grade of C or better; junior or senior classification in
manufacturing and mechanical engineering technology.

MMET 402 Inspection Methods and Procedures
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Methods and procedures in nondestructive inspection of materials
and industrial products; ultrasonics, dye penetrants, magnetic particle,
radiography and supportive evaluation methods such as weld sectioning,
polishing, etching and macroscopic analysis.
Prerequisites: Grade of C or better in MMET 281 and MMET 376;
completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and
CHEM 117, and PHYS 218 with a grade of C or better; junior or senior classification in
manufacturing and mechanical engineering technology.

MMET 405 Weldability of Ferrous Metals
Credits 3. 3 Lecture Hours.
Applied principles of metallurgy with reference to weldability of ferrous
metals.
Prerequisites: MMET 207 or MEEN 340; MMET 313 or approval of
instructor; admitted to major degree sequence (upper-level) in engineering
technology.

MMET 410 Manufacturing Automation and Robotics
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Hardware for automated work handling, conveyors, loaders, robots,
storage devices; power sources and methods of control, electric motors,
controllers, program logic controllers, robot programming; interfacing of
equipment controls; and manufacturing work cells.
Prerequisites: Grade of C or better in MMET 361, MMET 376, MMET
380, MMET 383 and IDIS 300; completion of ENGL 104, MATH 151,
MATH 152, CHEM 107 and CHEM 117, and PHYS 218 with a grade of C
or better; junior or senior classification in manufacturing and mechanical
engineering technology.

MMET 412 Production and Inventory Planning
Credits 3. 2 Lecture Hours. 2 Lab Hours.
An introductory treatment of models and techniques for the planning of
production and inventory systems.
Prerequisites: Grade of C or better in MMET 320, MMET 380, MMET 383
and ISEN 302; completion of ENGL 104, MATH 151, MATH 152, CHEM
107 and CHEM 117, and PHYS 218 with a grade of C or better; senior
classification in manufacturing and mechanical engineering technology.

MMET 414 Micro/Nano Manufacturing
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Product miniaturization and impact; review of atomic structure,
electrical and physical properties of materials; ultraprecision machining;
microlithography; dry and wet etching/sputtering techniques; isotropic and
anisotropic processes; pattern transfer with additive processes; surface
micromachining; microreplication processes; introduction to packaging
technology and nanometrology; manufacturing of selected microsystems
(MEMS) and their applications.
Prerequisites: CHEM 107; PHYS 208; senior or graduate in engineering
or science; admitted to major degree sequence (upper-level) in
engineering technology for ENTC majors.

MMET 418 Medical Manufacturing
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Surveys relevant regulations, biocompatibility of engineering materials,
and emphasizes suitable techniques for medical device manufacturing.
Prerequisites: MMET 181, junior or senior level classification or approval
of instructor.

MMET 422 Manufacturing Technology Projects
Credits 2. 1 Lecture Hour. 3 Lab Hours.
A capstone projects course utilizing a team approach to an analysis and
solutions of manufacturing problems.
Prerequisites: MMET 429 with a grade of C or better; completion of
junior-level courses; must be taken semester of graduation; approval
of instructor; completion of ENGL 104, MATH 151, MATH 152, CHEM
107 and CHEM 117, and PHYS 218 with a grade of C or better; senior
classification in manufacturing and mechanical engineering technology.

MMET 429 Managing People and Projects in a Technological Society
Credits 3. 3 Lecture Hours.
Supervisory and project management duties and responsibilities in
technology based organizations and the methods required to fulfill these
functions.
Prerequisites: ISEN 302 with a grade of C or better, or approval of
instructor; must be taken during long semester prior to MMET 422;
completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM
117, and PHYS 218 with a grade of C or better; senior classification in
manufacturing and mechanical engineering technology.

MMET 463 Mechanical Design Applications II
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Applications of principles of analysis and design of machines and machine
elements including linkages, robots, cam and follower systems, shafts,
gears, clutches, belt and chain drives; introduction to the mathematical
tools for the analysis and design of these machines and machine
elements.
Prerequisites: Grade of C or better in MMET 361 and MMET 363;
completion of ENGL 104, MATH 151, MATH 152, CHEM 107 and CHEM
117, and PHYS 218 with a grade of C or better; senior classification in
manufacturing and mechanical engineering technology.

MODL - Modern Languages

Courses

MODL 221/ENGL 221 World Literature
Credits 3. 3 Lecture Hours.
Survey of world literature from the ancient world through the sixteenth
century in relation to its historical and cultural contexts; texts selected from
a diverse group of authors, traditions and genres.
Cross Listing: ENGL 221/MODL 221.
MODL 222/ENGL 222 World Literature
Credits 3. 3 Lecture Hours.
Survey of world literature from the seventeenth century to the present in relation to its historical and cultural contexts; texts selected from a diverse group of authors, tradition and genres.
Cross Listing: ENGL 222/MODL 222.

MODL 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of modern languages. May be repeated for credit.
Prerequisite: Approval of department head.

MODL 485 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Individual supervision of readings or assigned projects, selected for each student individually. Written and oral reports. No class meetings.
Prerequisite: Approval of department head.

MODL 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of modern languages. May be repeated for credit.
Prerequisite: Approval of department head.

MSEN -Materials Science & Engr

Courses

MSEN 201 Introduction to Materials Science
Credits 3. 3 Lecture Hours.
Processing, structure, properties and performance in materials; materials structure and defects over many orders of scale; mechanical, thermal, electrical, magnetic and optical properties.
Prerequisites: CHEM 102 or CHEM 104 or CHEM 107; PHYS 218.

MSEN 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed study of selected problems in the area of materials science and engineering. May be taken for credit 4 times.
Prerequisite: Approval of instructor.

MSEN 289 Special Topics In...
Credits 1 to 3. 1 to 3 Lecture Hours. 0 to 3 Lab Hours.
Selected topics in an identified area of materials science and engineering. May be repeated for credit.
Prerequisite: Approval of instructor.

MSEN 310 Structure of Materials
Credits 3. 3 Lecture Hours.
Symmetry, unit cell and the atomic structure of crystalline and non-crystalline materials; the bonding forces and energy for van der Waals, metallic, ionic and covalent crystals.
Prerequisites: MSEN 201 or approval of instructor; junior or senior classification.

MSEN 410 Materials Processing
Credits 3. 3 Lecture Hours.
Synthesis, properties and processing of technologically important inorganic materials (metals and ceramics); includes thermodynamics and kinetics of different materials processing methods, casting, deformation processing, heat treatments, powder processing and sintering, coating and thin films processing, etc.
Prerequisites: MSEN 201 or approval of instructor; junior or senior classification.

MSEN 420 Polymer Science
Credits 3. 3 Lecture Hours.
Polymer structure, processing, property characterization at the molecular, microscopic and macroscopic dimensional levels for thermosets, thermoplastics, elastomers, fibers and advanced non-particle filled composites and smart multi-performance structures.
Prerequisites: MSEN 201 or MEEN 222 or AERO 213 or CHEN 313; junior or senior classification.

MSEN 460 Electronic, Optical and Magnetic Properties of Materials
Credits 3. 3 Lecture Hours.
Prerequisites: MSEN 201 or approval of instructor; junior or senior classification.

MSEN 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed study of selected problems in the area of materials science and engineering. May be taken four times for credit.
Prerequisite: Approval of instructor.

MSEN 489 Special Topics In...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of materials science and engineering. May be repeated for credit.
Prerequisite: Approval of instructor.

MSEN 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of a faculty member in materials science and engineering. May be taken four times for credit.
Prerequisites: Junior or Senior classification or approval of instructor.

MSEN 601 Fundamental Materials Science and Engineering
Credits 4. 4 Lecture Hours.
Fundamentals of microstructure - properties and relationship of materials. Topics will include: electronic and atomic structure of solids, structure of crystalline materials, imperfections in crystalline materials, introduction to dislocation theory, mechanical properties, fundamental thermodynamics of materials, phase equilibria and diagrams, diffusion, and kinetics of phase transformations.
Prerequisite: Graduate classification.
MSEN 602 Advanced Materials Science and Engineering
Credits 4. 4 Lecture Hours.
Fundamentals of quantum mechanics, physics of solid state, and physical electronics and photonics for advanced materials. Topics will include: basic quantum mechanical problems, quantum basis for structural and physical properties of solids, lattice vibrational effects in solids, free electron model for magnetism in solids, semiconductor materials and devices, nanostructures and mesoscopic phenomena, superconductivity, recent advances in new types of materials.
Prerequisite: MSEN 604, undergraduate quantum mechanics course, or approval of instructor.

MSEN 603 Fundamentals of Soft and Biomaterials
Credits 3. 3 Lecture Hours.
Introductory graduate-level survey on the general areas of soft materials and biomaterials; includes basic concepts of colloidal particle physics, polymer physics and chemistry, and general concepts in biomaterials.
Prerequisites: Undergraduate general chemistry course; graduate classification.

MSEN 604 Quantum Mechanics for Materials Scientists
Credits 3. 3 Lecture Hours.
Provides a background in quantum mechanics for graduate materials scientists or engineers with little or no quantum mechanics background. The following topics will be covered: origins of quantum theory, interpretation, Schroedinger equation and its applications, operator mechanics, approximation methods, angular momentum, the hydrogen atom, and quantum statistics.
Prerequisites: MATH 601, MATH 311 or approval of instructor; graduate classification.

MSEN 606 Multifunctional Materials
Credits 3. 3 Lecture Hours.
In-depth analysis of multifunctional materials and composites, and their novel applications.
Prerequisites: MEMA 602/AERO 603/AERO 603/MEMA 602, MSEN 601.
Cross Listing: AERO 606 and MEMA 606.

MSEN 607/MEEN 607 Polymer Physical Properties
Credits 3. 3 Lecture Hours.
Macromolecular concepts; molecular weight characterization; solubility parameters; phase diagrams; viscoelasticity; rheology; thermal behavior; damage phenomena; morphology; crystallization; liquid crystallinity; nanocomposites.
Prerequisites: MEEN 222 (or other intro to materials science course).
Cross Listing: MSEN 607/MEEN 607.

MSEN 608 Nanomechanics
Credits 3. 3 Lecture Hours.
Application of mechanics concepts to nano-scale behavior of materials. Review of continuum mechanics; Extensions to generalized continua; Nonlocal elasticity; Nano-scale plasticity. Focus on multi-scale modeling: Dislocation Dynamics; Quasi-Continuum method; Molecular dynamics with introductions to quantum mechanics and statistical mechanics.
Prerequisite: AERO 603/MEMA 602.
Cross Listing: AERO 608 and MEMA 608.

MSEN 612/BIOL 602 Fundamentals of Transmission Electron Microscopy
Credits 3. 2 Lecture Hours. 6 Lab Hours.
(2-6) State-of-the-art fundamentals in TEM; theoretical background supporting a strong hands-on course component comprising specimen preparation and image acquisition/interpretation; practical experience to attain a proficiency level permitting independent operation of one of the transmission electron microscopes in the Microscopy and Imaging Center.
Prerequisite: Graduate classification or approval of instructor.
Cross Listing: BIOL 602/MSEN 612 or MSEN 612/BIOL 602.

MSEN 613/BIOL 603 Advanced Transmission Electron Microscope (TEM) Methodologies in Life and Materials Science (TEM II)
Credits 3. 1 Lecture Hour. 6 Lab Hours.
Advanced TEM methodologies, including specimen preparation and TEM imaging/analysis techniques as applicable to both biological and material samples; theory designed to support a strong hands-on component comprising specimen preparation, different imaging/diffraction/ spectroscopic techniques and data interpretation.
Prerequisite: BIOL 602/MSEN 612 or MSEN 612/BIOL 602.
Cross Listing: BIOL 603/MSEN 613.

Credits 2. 1 Lecture Hour. 3 Lab Hours.
Fundamentals of Scanning Electron Microscopy (SEM) and Environmental Scanning Electron Microscopy (ESEM). Provides biologists, material scientists and students from other disciplines with the techniques of operation of the scanning electron microscope (SEM) and the environmental SEM (ESEM) coupled with the appropriate theoretical background knowledge; individual instruction in support of their research endeavors involving SEM/ESEM.
Prerequisite: Graduate classification.
Cross Listing: BIOL 604/MSEN 614.

MSEN 616/MEEN 616 Surface Science
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Properties of surfaces, principles of classic and contemporary surface characterization techniques, recent development and roles of surface science in advanced technology.
Prerequisite: Graduate classification.
Cross Listing: MEEN 616/MSEN 616.

MSEN 618/MEEN 686 Composite Materials Processing and Performance
Credits 3. 3 Lecture Hours.
Fundamental science and design; processing and design interaction regarding multiphase composites; processing science, experimental characterization, laminate analysis; design structure and processing.
Prerequisite: Elasticity, continuum mechanics, or equivalent; graduate classification.
Cross Listing: MEEN 686/MSEN 618.

MSEN 619 Materials Modeling of Phase Transformation and Microstructural Evolution
Credits 3. 3 Lecture Hours.
Computer modeling and simulation of microstructural evolution during various phase transformation processes in solid materials, including spinodal decomposition, ordering, martensitic transformation, ferroelectric and ferromagnetic domain evolution, dislocation dynamics, and crack propagation.
Prerequisites: Graduate classification and approval of instructor.
MSEN 620/MEEN 620 Kinetic Processes in Materials Science
Credits 3. 3 Lecture Hours.
Atomistic and mesoscale levels; foundation for microstructural evolution and behavior of materials; basic and irreversible thermodynamics; diffusion equations solutions; atomistic diffusion, nucleation; phase transformations: gas-solid, liquid-solid and solid-solid reactions; FiPy (finite volume solver for PDE) to simulate kinetic processes.
Prerequisites: MEEN 222 or equivalent materials science course; preliminary general thermodynamics course is not necessary.
Cross Listing: MEEN 620/MSEN 620.

MSEN 625/MEEN 625 Mechanical Behavior of Materials
Credits 3. 3 Lecture Hours.
Examination of deformation and microstructure mechanisms responsible for deformation and failure in metals; fatigue, creep, and fracture mechanisms of materials; emphasis on microstructural-mechanical property relationship.
Prerequisite: Undergraduate-level materials science course.
Cross Listing: MEEN 625/MSEN 625.

MSEN 626/MEEN 606 Polymers Laboratories
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Introduction to basic experimental skills relating to polymers; experiments include polymerization, molecular weight determination, FTIR, tensile test, NMR, DSC, swelling index, viscosity, x-ray diffraction.
Prerequisite: Graduate classification.
Cross Listing: MEEN 606/MSEN 626.

MSEN 636 Damage Mechanics and Failure in Composite Materials
Credits 3. 3 Lecture Hours.
Mechanisms and models related to damage and failure in composite materials subjected to mechanical loads.
Prerequisites: Courses in composite materials, elasticity; graduate classification.
Cross Listing: AERO 616 and MEMA 616.

MSEN 640/MEEN 640 Thermodynamics in Materials Science
Credits 3. 3 Lecture Hours.
Use of thermodynamic methods to predict behavior of materials; codification of thermodynamic properties into simplified models; principles, methods, and models to generate accurate equilibrium maps through computational thermodynamics software; applications to bulk metallic, polymeric and ceramic materials, defects, thin films, electrochemistry, magnetism.
Prerequisites: MEEN 222 or equivalent; graduate classification.
Cross Listing: MEEN 640/MSEN 640.

MSEN 641 Plasticity Theory
Credits 3. 3 Lecture Hours.
Theory of plastic yield and flow of two and three-dimensional bodies; classical plasticity theories, unified viscoplastic theories, numerical considerations; applications and comparisons of theory to experiment.
Prerequisite: MEMA 602/AERO 603.
Cross Listing: MEEN 666 and MEMA 641.

MSEN 656/MEEN 656 Mechanical and Physical Properties of Thin Films
Credits 3. 3 Lecture Hours.
Mechanical properties (hardness, stress, strain, delamination, fracture) of films; nanomechanical testing techniques; electrical properties of thin films; electrical properties measurement techniques; magnetic properties of films; magnetic properties measurement techniques; laboratory includes (1) thin film fabrication (sputtering, PVD); (2) nanomechanical testing; (3) electrical/magnetic measurement.
Prerequisite: MEEN 222, MSEN 601, or basic materials science background.
Cross Listing: MSEN 656/MSEN 656.

MSEN 658/MEEN 658 Fundamentals of Ceramics
Credits 3. 3 Lecture Hours.
Atomic bonding; crystalline and glassy structure; phase equilibria and ceramic reactions; mechanical, electrical, thermal, dielectric, magnetic, and optical properties; ceramic processing.
Prerequisite: MEEN 222 or equivalent or approval of instructor.
Cross Listing: MSEN 658/MSEN 658.

MSEN 670 Computational Materials Science and Engineering
Credits 3. 3 Lecture Hours.
Modern methods of computational modeling and simulation of materials properties and phenomena, including synthesis, characterization, and processing of materials, structures and devices; quantum, classical, and statistical mechanical methods, including semi-empirical atomic and molecular-scale simulations, and other modeling techniques using macroscopic input.
Prerequisites: Approval of instructor; graduate classification.
Cross Listing: CHEN 670 and MEMA 670.

MSEN 681 Seminar
Credit 1. 1 Lecture Hour.
Selected research topics in materials science and engineering presented by faculty, students, and outside speakers.
Prerequisite: Graduate classification.

MSEN 684 Professional Internship
Credits 1 to 9. 1 to 9 Other Hours.
Directed internship in an industrial or laboratory setting under the supervision of successful, experienced personnel; work related to the student's career aspirations and areas of specialization. May be taken 2 times for credit.
Prerequisite: Graduate classification.

MSEN 685 Directed Studies
Credits 1 to 12. 1 to 12 Other Hours.
Special topics not within the scope of thesis research and not covered by other formal courses.
Prerequisite: Graduate classification.

MSEN 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of materials science and engineering. Potential topics include: advanced phase transformations, advanced materials and processing, nanomaterials and nanotechnologies, computational modeling of materials, advanced techniques of spectroscopy, surface and interface phenomena, thin film processing, ceramic engineering, organic materials for electronic and photonic devices, biomedical microdevices, materials fabrication, processing and fabrication of semiconductors, and materials and processing for MEMS. May be repeated for credit.
Prerequisite: Approval of instructor.
MSEN 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research toward thesis or dissertation.

MUSC - Music

Courses

MUSC 102 Fundamentals of Music
Credits 3. 3 Lecture Hours.
(MUSI 1300, 1301, 1030, 1304) Fundamentals of Music. Introduction to the basic elements of music (pitch, rhythm, scales, intervals and triads) and how these elements interrelate to form musical compositions; the application of musical understanding to particular instruments such as the guitar, keyboard, recorder and voice.

MUSC 200 Topics in Music
Credits 3. 3 Lecture Hours.
The study of a circumscribed musical topic in its sociohistorical context; emphasis on the aesthetic, social and cultural issues affecting music rather than on technical analysis. May be repeated for credit.

MUSC 204 Music Theory I
Credits 2. 2 Lecture Hours. 1 Lab Hour.
(MUSI 1211) Music Theory I. Basic concepts of harmonic and contrapuntal structures in diatonic tonal music, musical analysis of these structures, and musical composition; using these structures for piano solo, voice and piano and other small ensembles; includes harmonic progression, root/first/second inversion harmonies, cadences and 2v 1st-, 2nd-, and 4th-species counterpoint.
Prerequisites: MUSC 102 or placement exam and music major or minor status; concurrent enrollment in MUSC 205.

MUSC 204 Music Theory II
Credits 2. 2 Lecture Hours. 1 Lab Hour.
(MUSI 1212) Music Theory II. Continuation of harmonic and contrapuntal principles in chromatic tonal music, musical analysis of these structures, and musical composition using these structures for small ensembles; includes secondary functions, common-chord modulation, basic reductive techniques and compound melody, phrase structure, 2v imitative counterpoint, and 2v 3rd- and 5th-species.
Prerequisites: MUSC 204 and 208 and music major or minor status; concurrent enrollment in MUSC 210.

MUSC 206 Music Theory III
Credits 2. 2 Lecture Hours. 1 Lab Hour.
(MUSI 2211, 2212, 2311, 2312) Music Theory III. Continued study of harmonic, contrapuntal and set-theoretical principles, composition and analysis of highly chromatic tonal music and twentieth-century music; includes mode mixture, Neapolitans, augmented sixths, "tall" chords, substitute chords, passing harmonies, enharmonicism, extended chromaticism, modes, artificial scales, impressionism, pandiatonicism, atonality, serialism, aleatory, sound mass, minimalism and electronic music.
Prerequisites: MUSC 205 and MUSC 210, and music major or minor status; concurrent enrollment in MUSC 212.

MUSC 207 Form and Analysis
Credits 2. 2 Lecture Hours. 1 Lab Hour.
Focus on phrase structure, traditional small and large forms in full score, Baroque compositional procedures, reductive (pre-Shenkerian) analytical techniques and Schoenberger composition theory; extensive listening, reading and analysis; includes binary, ternary, rondo, variation, sonata and fugue; musicianship studies from earlier courses.
Prerequisites: MUSC 206 and MUSC 212 and music major or minor status.

MUSC 208 Musicianship I
Credit 1. 2 Other Hours.
(MUSI 1116, 1216) Musicianship I. Application of concepts taught in MUSC 204; focus on ear training, aural analysis, sight singing, rhythm and rudimentary keyboard skills.
Prerequisites: MUSC 102, and music major or minor status; concurrent enrollment in MUSC 204.

MUSC 210 Musicianship II
Credit 1. 2 Other Hours.
(MUSI 1117, 1217) Musicianship II. Application of concepts taught in corequisite course MUSC 205; focus on ear training, aural analysis, sight singing, rhythm and rudimentary keyboard skills.
Prerequisites: MUSC 204 and MUSC 208 and music major or minor status; concurrent enrollment in MUSC 205.

MUSC 212 Musicianship III
Credit 1. 2 Other Hours.
Application of concepts taught in MUSC 206; focus on ear training, aural analysis, sight singing, rhythm and rudimentary keyboard skills.
Prerequisites: MUSC 205 and MUSC 210 and music major or minor status; concurrent enrollment in MUSC 204.

MUSC 214 Perspectives on World Music
Credits 3. 3 Lecture Hours.
A thematic overview of basic issues in ethnomusicology; provides an appreciation for the diversity of ways in which music sound and music making are organized in world cultures; includes music making and the performance event, music and identity, music and nationalism, and music and globalization.
Prerequisites: MUSC 204, ENGL 104 and ANTH 201, or approval of instructor.

MUSC 215 Fieldwork in World Music
Credits 3. 3 Lecture Hours.
Hands-on experience with readings in and critical analysis of ethnographic musical research; philosophies and practices of fieldwork on the world's music.
Prerequisite: MUSC 214 or approval of instructor.

MUSC 221 Guitar Heroes
Credits 3. 3 Lecture Hours.
Survey of social, cultural and aesthetic transformations of music history centered on important classical guitarists; exploration of their performance and compositional/musical styles; analysis of how their contributions gave rise to and revived the guitar's popularity as a concert-level instrument in both the classical and folk idioms.

MUSC 222 Music of the Americas
Credits 3. 3 Lecture Hours.
Evolution of music of the Americas and the Caribbean; influence of natives, people of forced relocation and people from European communities; the syncretic process of music making.
MUSC 225 History of Jazz  
Credits 3.3 Lecture Hours.  
Non-technical survey of jazz as America’s classical music, from the earliest recorded blues through the most recent trends; examination of how jazz has broadly expressed issues of modern life.

MUSC 226 History of Rock  
Credits 3.3 Lecture Hours.  
Examination of the development of rock music; emphasis on how the sounds and meaning of music reflects culture, ideology and history.

MUSC 227 Popular Music of India  
Credits 3.3 Lecture Hours.  
Introduction to Indian popular musics and society; focus on musical, cultural and aesthetic features of “Bollywood” films and film songs; overview of Indian social, cultural and religious expression.

MUSC 228 History of Electronic Music  
Credits 3.3 Lecture Hours.  
Historical survey of electronic music, including key technological advancements, people and musical works; exploration of electronic music from different genres and countries.

MUSC 235 Introduction to Composition  
Credits 3.3 Lecture Hours.  
Significant styles and techniques in contemporary music including classical, jazz and popular trends; contemporary sonic design achieved through written exercises, reading and critical listening.  
Prerequisite: MUSC 204.

MUSC 245 Composition I  
Credit 1.2 Other Hours.  
(MUSI 1286) Composition I. Instruction in composition; the writing of small-form musical compositions employing contemporary styles; techniques in writing for instrumental, vocal, electronic and mixed-media resources. May be taken 2 times for credit.  
Prerequisite: MUSC 207 or approval of instructor.

MUSC 253 Individual Performance: Guitar I  
Credit 1.0 Lecture Hours. 3 Lab Hours.  
(MUSI 1192) Individual Performance: Guitar I. Instruction in guitar performance; broad range of literature with special emphasis on the historical and theoretical aspects that reveal the performance practices of specific periods; individual and group laboratory instruction. May be taken six times for credit.  
Prerequisite: Approval of instructor.

MUSC 254 Individual Performance--Voice I  
Credit 1.2 Other Hours.  
(MUSI 1183, 1184, 2182, 2184) Individual Performance--Voice I. Instruction in vocal performance; broad range of literature with special emphasis on the historical and theoretical aspects that reveal the performance practices of specific periods; individual and group laboratory instruction. May be repeated for credit.  
Prerequisite: Approval of instructor.

MUSC 255 Individual Performance—Keyboard I  
Credit 1.2 Other Hours.  
(MUSI 1114, 1115, 1181, 1182, 2115, 2181, 2182) Individual Performance—Keyboard I. Instruction in keyboard performance; broad range of literature with special emphasis on the historical and theoretical aspects that reveal the performance practices of specific periods; individual and group laboratory instruction. May be repeated for credit.  
Prerequisite: Approval of instructor.

MUSC 256 Individual Performance: String I  
Credit 1.0 Lecture Hours. 3 Lab Hours.  
(MUSI 1195) Individual Performance: String I. Instruction in string performance; broad range of literature with special emphasis on the historical and theoretical aspects that reveal the performance practices of specific periods; individual and group laboratory instruction. May be taken six times for credit.  
Prerequisite: Approval of instructor.

MUSC 259 Individual Performance via Classroom Instruction  
Credit 1.0 Lecture Hours. 3 Lab Hours.  
Individual performance skills studied in a classroom setting; broad range of literature with special emphasis on the historical and theoretical aspects that reveal the performance practices of specific periods. May be taken six times for credit.

MUSC 270 Individual Performance: Woodwind I  
Credit 1.3 Lab Hours.  
(MUSI 1166) Individual Performance: Woodwind I. Instruction in woodwind performance; broad range of literature with special emphasis on the historical and theoretical aspects that reveal the performance practices of specific periods; individual and group laboratory instruction. May be taken six times for credit.  
Prerequisite: Approval of instructor.

MUSC 271 Individual Performance: Brass I  
Credit 1.3 Lab Hours.  
(MUSI 1178) Individual Performance: Brass I. Instruction in brass performance; broad range of literature with special emphasis on the historical and theoretical aspects that reveal the performance practices of specific periods; individual and group laboratory instruction. May be taken six times for credit.  
Prerequisite: Approval of instructor.

MUSC 272 Individual Performance: Percussion I  
Credit 1.3 Lab Hours.  
(MUSI 1188) Individual Performance: Percussion I. Instruction in percussion performance; broad range of literature with special emphasis on the historical and theoretical aspects that reveal the performance practices of specific periods; individual and group laboratory instruction. May be taken six times for credit.  
Prerequisite: Approval of instructor.

MUSC 280 Ensemble Performance--Symphonic Band  
Credit 1.3 Lab Hours.  
Three select musical performing ensembles (symphonic, concert and campus bands) composed of 65 to 100 members each and devoted to learning the extensive literature written for wind band; activities include at least two concerts per semester; annual tours during spring for the symphonic band. Students may register in up to but no more than two different sections of this course. May be repeated for credit.  
Prerequisite: Satisfactory audition.

MUSC 281 Ensemble Performance--Small Ensembles  
Credit 1.3 Lab Hours.  
Participation in small ensemble performance; the study and performance of small ensemble repertoire from all historical periods and styles. May be repeated for credit.  
Prerequisite: Satisfactory audition.
**MUSC 282 Ensemble Performance--Jazz Ensemble**  
**Credit 1. 3 Lab Hours.**  
A select musical performing ensemble of 18 to 25 members devoted to performing all styles and periods of jazz music from big band to modern jazz; activities include at least 2 performances each semester. May be repeated for credit.  
**Prerequisite:** Satisfactory audition.  

**MUSC 283 University Student Orchestra**  
**Credit 1. 3 Lab Hours.**  
The rehearsal and performance of orchestra literature of various historical backgrounds; full ensemble rehearsal, individual practice, and public performances; development of knowledge, understanding, and appreciation for aspects of music ranging from the Renaissance to the Modern Era. May be repeated 10 times for credit.  
**Prerequisites:** Previous orchestral experience; successful audition with Conductor.  

**MUSC 285 Directed Studies**  
**Credits 0 to 9. 0 to 3 Other Hours.**  
Directed Studies in specific problems in identified areas of music. May be repeated for credit up to 9 hours.  
**Prerequisites:** Approval of instructor and department head; MUSC majors and minors only.  

**MUSC 286 Ensemble Performance--Symphony Orchestra**  
**Credit 1. 3 Other Hours.**  
Participation in the Brazos Valley Symphony Orchestra, a community/university ensemble; includes rehearsals off campus and varying course requirements depending on the setting and needs of the student. May be repeated for credit.  
**Prerequisite:** Satisfactory audition.  

**MUSC 289 Special Topics in...**  
**Credits 1 to 4. 1 to 4 Lecture Hours.**  
Selected topics in an identified area of music. May be repeated for credit.  
**Prerequisite:** Approval of instructor.  

**MUSC 290 Ensemble Performance--Choir**  
**Credit 1. 1 Other Hour.**  
A select musical performing ensemble composed of 40 to 70 members devoted to learning and performing works from the vast repertory of choral music from all historical periods and styles; several performances, occasionally with orchestra, each semester on and off campus. Students may register in up to but no more than two different sections of this course. May be repeated for credit.  
**Prerequisite:** Satisfactory audition.  

**MUSC 301 Performance in World Cultures**  
**Credits 3. 3 Lecture Hours.**  
Application of the tools of performance studies to explore the enactment of the arts in world cultures and the ways the people of every society express themselves in performance; examination of different genres of performance through music, theatre, verbal art and dress.  
**Prerequisite:** Junior or senior classification or approval of instructor.  
**Cross Listing:** PERF 301 and THAR 301.  

**MUSC 311 Music in Early Western Culture**  
**Credits 3. 3 Lecture Hours.**  
Survey of styles, genres, and forms in Western music, focusing on the lives and works of the principal composers from Greek antiquity to the end of the Baroque period within the context of political, social and cultural developments.  
**Prerequisite:** MUSC 202, MUSC 205, or approval of instructor.  

**MUSC 312 Music in Modern Western Culture**  
**Credits 3. 3 Lecture Hours.**  
Survey of styles, genres, and forms in Western music, focusing on the lives and works of the principal composers from the middle of the eighteenth century to the present within the context of political, social and cultural developments.  
**Prerequisite:** MUSC 202, MUSC 205, or approval of instructor.  

**MUSC 315 Music in the 20th Century**  
**Credits 3. 3 Lecture Hours.**  
The understanding and enjoyment of twentieth century music; survey of the broad panorama of the contemporary scene and an assessment of the forces that have shaped the musical climate we inhabit.  
**Prerequisite:** MUSC 206 or approval of instructor.  

**MUSC 316 Music and Technology**  
**Credits 3. 3 Lecture Hours. 1 Lab Hour.**  
Study of music produced with the aid of electronic and computer technologies; critical listening and analysis of music literature; understanding of technical concepts; required laboratory provides creative practical experience in studio and live performance applications.  
**Prerequisite:** Junior or senior classification and MUSC 206, PERF 202, or approval of instructor.  

**MUSC 317 Recording and the Producer**  
**Credits 3. 3 Lecture Hours.**  
Tools and techniques of studio recording; the studio as compositional tool; recorded literature examining the creative and ideological impact of the producer; recording projects applying course techniques and exploring aesthetic concepts.  
**Prerequisite:** MUSC 316 or approval of instructor.  

**MUSC 318/PERF 318 Electronic Composition**  
**Credits 3. 3 Lecture Hours.**  
Project-based study of techniques for creating electronic and mixed-media performance; critical analysis of important electronic and interactive works; interactive media programming techniques for sound and video synthesis, sampling, digital signal processing.  
**Prerequisites:** Junior or senior classification and MUSC 316, PERF 202, or approval of instructor.  
**Cross Listing:** PERF 318/MUSC 318.  

**MUSC 321 The Symphony Orchestra and Its Music**  
**Credits 3. 3 Lecture Hours.**  
The development of the symphony orchestra with particular attention to its vast musical repertory, and the colorful personalities associated with it; the organization and management of this musical institution including local arts support and volunteerism.  
**Prerequisite:** Approval of instructor.  

**MUSC 324/ANTH 324 Music in World Cultures**  
**Credits 3. 3 Lecture Hours.**  
Examination of music from an ethnomusicological perspective focusing on musical performance and the complex interrelationship of music to culture, society and daily life; examination of music from a variety of cultures through a series of case studies.  
**Prerequisite:** Junior or senior classification or approval of instructor.  
**Cross Listing:** ANTH 324/MUSC 324.
MUSC 325/PERF 325 Dance and World Cultures
Credits 3. 3 Lecture Hours.
Examination of international relationships between dance, culture, identity, gender, youth and politics; relationships between dancing, gender and politics in specific cultures and in globalization; variety of dance practices around the globe.
Prerequisite: Junior or senior classification.
Cross Listing: PERF 325/MUSC 325.

MUSC 326 Dance and Identity in the United States
Credits 3. 3 Lecture Hours.
Analysis of dance events as complex sites for social action; examines dances performed by diverse groups of people; considers such issues as identity, community, diversity, gender and representation in the United States.
Prerequisite: Junior or senior classification.

MUSC 327 Popular Musics in the African Diaspora
Credits 3. 3 Lecture Hours.
Examination of a range of popular musics from the twentieth century that have emerged in conjunction with the historical global spread of peoples and cultures from the African continent; technical knowledge about music is not required; focus on social and cultural contexts for popular music.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: AFST 327 and PERF 327.

MUSC 328/THAR 328 Japanese Traditional Performing Arts
Credits 3. 3 Lecture Hours.
Study of various genres of Japanese performing arts from the 7th century to the present; understanding the genres in their historical and cultural contexts and recognizing shared aesthetic values.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: THAR 328/MUSC 328.

MUSC 345 Composition II
Credit 1. 2 Other Hours.
Advanced instruction in composition; the writing of large-form musical compositions employing contemporary styles; techniques in writing for instrumental, vocal, electronic and mixed-media resources. May be repeated for credit.
Prerequisite: MUSC 245 or approval of instructor.

MUSC 352 IND PERF-BAND & ORCH II
Credit 1. 2 Other Hours.

MUSC 353 Individual Performance: Guitar II
Credit 1. 3 Lab Hours.
Advanced instruction in guitar performance; broad range of literature with special emphasis on the historical and theoretical aspects that reveal the performance practices of specific periods; individual and group laboratory instruction. May be taken six times for credit.
Prerequisites: Junior or senior classification and approval of instructor.

MUSC 354 Individual Performance--Voice II
Credit 1. 2 Lab Hours.
Advanced instruction in voice performance; broad range of literature with special emphasis on the historical and theoretical aspects that reveal the performance practices of specific periods; individual and group laboratory instruction. May be repeated for credit.
Prerequisite: Junior or senior classification and approval of instructor.

MUSC 355 Individual Performance—Keyboard II
Credit 1. 2 Lab Hours.
Advanced instruction in keyboard performance; broad range of literature with special emphasis on the historical and theoretical aspects that reveal the performance practices of specific periods; individual and group laboratory instruction. May be repeated for credit.
Prerequisites: Junior or senior classification and approval of instructor.

MUSC 356 Individual Performance: String II
Credit 1. 3 Lab Hours.
Advanced instruction in string performance; broad range of literature with special emphasis on the historical and theoretical aspects that reveal the performance practices of specific periods; individual and group laboratory instruction. May be taken six times for credit.
Prerequisites: Junior or senior classification and approval of instructor.

MUSC 357 Individual Performance: Woodwind II
Credit 1. 3 Lab Hours.
Advanced instruction in woodwind performance; broad range of literature with special emphasis on the historical and theoretical aspects that reveal the performance practices of specific periods; individual and group laboratory instruction. May be taken six times for credit.
Prerequisites: Junior or senior classification and approval of instructor.

MUSC 365 Composition II
Credit 1. 3 Lab Hours.
Advanced instruction in composition; the writing of large-form musical compositions employing contemporary styles; techniques in writing for instrumental, vocal, electronic and mixed-media resources. May be repeated for credit.
Prerequisite: MUSC 245 or approval of instructor.

MUSC 366/THAR 366 Evolution of the American Musical
Credits 3. 3 Lecture Hours.
Examination of the American musical from its heterogeneous origins to a thriving and diverse expression of the human condition; analysis and critical discourse on the development of the American musical through text, audio and visual recordings.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: THAR 366/MUSC 366.

MUSC 400 Senior Seminar and Project
Credits 3. 3 Other Hours.
Culminating senior project on an individually-chosen research topic, presentation of a recital, or lecture-demonstration.
Prerequisites: Senior classification (completion of all 300- and 400-level coursework required for the B.A. in Music); music major status; approval of instructor, advisor, and department head.

MUSC 402 Intermedia Performance
Credits 3. 3 Lecture Hours.
Study of theory, history, literature and techniques of intermedia composition and design for film, theatre, dance, interactive media, and other forms of performance; examination of the collaborative creative process; projects in interdisciplinary performance.
Prerequisites: Junior or senior classification and MUSC 316, PERF 202, or approval of instructor.
Cross Listing: FILM 402 and PERF 402.
MUSC 424 TOPICS ETHNOMUSICOLOGY
Credits 3.3 Lecture Hours.
Topics in Ethnomusicology. Study and application of ethnomusicological theory, method, and literature in a variety of historical and geographical contexts. May be taken four times for credit.
Prerequisite: Junior or senior classification.

MUSC 485 Directed Studies
Credits 0 to 3.0 to 3 Other Hours.
Advanced directed study of identified topic in music. May be repeated for credit up to 6 credit hours.
Prerequisites: Approval of instructor and department head; 24 hours of music; MUSC majors and minors only.

MUSC 489 Special Topics in...
Credits 1 to 4.1 to 4 Lecture Hours.
Selected topics in an identified area of music. May be repeated for credit.
Prerequisite: Approval of instructor.

MUSC 491 Research
Credits 0 to 3.0 to 3 Other Hours.
Research conducted under the direction of a faculty member in music. May be taken up to two times for credit.
Prerequisites: Junior or senior classification and approval of instructor.

NRSC - Neuroscience

Courses

NRSC 277/VIBS 277 Introduction to Neuroscience
Credits 3.3 Lecture Hours.
Neuroscience from the molecular to system levels; fundamental principles and knowledge of neuroscience; current research information on neuroscience.
Prerequisites: Freshman or sophomore classification and approval of instructor.
Cross Listing: VIBS 277/NRSC 277.

NRSC 289 Special Topics in...
Credits 1 to 4.1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of neuroscience. May be repeated for credit.
Prerequisite: Approval of instructor.

NRSC 311/PSYC 311 Comparative Psychology
Credits 3.3 Lecture Hours.
Survey of problems, principles, and methods of animal psychology; animal learning, motivation discriminative processes, and abnormal, social, and instinctual behaviors.
Prerequisites: PSYC 107; PSYC 203 and 204 or junior or senior classification.
Cross Listing: PSYC 311/NRSC 311.

NRSC 320/PSYC 320 Sensation-Perception
Credits 3.3 Lecture Hours.
Review of sensory physiology, sensory and perceptual phenomena and the major perceptual theories; current research in the field.
Prerequisites: PSYC 107; PSYC 203 and PSYC 204 or junior or senior classification.
Cross Listing: PSYC 320/NRSC 320.

NRSC 331/PSYC 331 Social Neuroscience
Credits 3.3 Lecture Hours.
Integration of biological and psychological explanations of social behavior; recent research and theories in social neuroscience; emotion, motivation, aggression, face processing, empathy, social cognition, and social relationships.
Prerequisites: PSYC 107 or approval of instructor; junior or senior classification.
Cross Listing: PSYC 331/NRSC 331.

NRSC 332/PSYC 332 Neuroscience of Learning and Memory
Credits 3.3 Lecture Hours.
Brain mechanisms of learning and memory from molecular to behavioral levels; synaptic plasticity, model systems, multiple memory systems, diseases of learning and memory.
Prerequisites: PSYC 107 or approval of instructor; junior or senior classification.
Cross Listing: PSYC 332/NRSC 332.

NRSC 333/PSYC 333 Biological Psychology
Credits 3.3 Lecture Hours.
Neurobiology and clinical explanation of molecular mechanisms underlying psychiatric disorders and their drug treatments; depression and bipolar, anxiety disorders, mood disorders, psychosis and schizophrenia.
Prerequisites: PSYC 107, PSYC 335/NRSC 335 or one year of biology; junior or senior classification.
Cross Listing: PSYC 333/NRSC 333.

NRSC 335/PSYC 335 Physiological Psychology
Credits 3.3 Lecture Hours.
Physiological bases of sensation, motor functions, emotion motivation, and complex psychological processes.
Prerequisites: 6 hours of biology; PSYC 203 and PSYC 204 or junior or senior classification.
Cross Listing: PSYC 335/NRSC 335.

NRSC 336/PSYC 336 Drugs and Behavior
Credits 3.3 Lecture Hours.
Physiological, pharmacological and behavioral effects of psychoactive drugs, including short-term and long-term effects of psychoactive drugs, properties of addictive drugs, etiology of addiction, and treatments of drug addiction and withdrawal.
Prerequisites: PSYC 335/NRSC 335 or NRSC 335/PSYC 335; junior or senior classification.
Cross Listing: PSYC 336/NRSC 336.

NRSC 340/PSYC 340 Psychology of Learning
Credits 3.3 Lecture Hours.
Survey of significant concepts, experimental methods and principles of learning.
Prerequisites: PSYC 107 or INST 301; PSYC 203 and PSYC 204 or junior or senior classification.

NRSC 360/PSYC 360 Health Psychology and Behavioral Medicine
Credits 3.3 Lecture Hours.
Survey of health psychology emphasizing behavioral and lifestyle factors in health and illness, prevention and modification of health-compromising behaviors, health care utilization, and psychological management of chronic disorders and terminal illness.
Prerequisite: PSYC 107.
Cross Listing: PSYC 360/NRSC 360.
NRSC 401/VIBS 401 Developmental Neurotoxicology
Credits 2. 2 Lecture Hours.
Efforts of exposure to toxic substances on the developing nervous system; content to include mechanisms of toxicity of substances potentially devastating to the developing nervous system including lead, mercury and other heavy metals, alcohol, nicotine (smoking), pesticides, flame retardants and others.
Prerequisite: Junior or senior classification.
Cross Listing: VIBS 401.

NRSC 407/VIBS 407 Core Ideas in Neuroscience
Credit 1. 1 Lecture Hour.
General overview of selected core ideas across the full spectrum of neuroscience.
Prerequisite: Junior or senior classification; background in science courses recommended.
Cross Listing: VIBS 407/NRSC 407.

NRSC 434/BIOL 434 Regulatory and Behavioral Neuroscience
Credits 3. 3 Lecture Hours.
Bioelectricity, nerve cell functions, brain functions; physiologic basis of behavior.
Prerequisites: BIOL 319 or BIOL 388.
Cross Listing: BIOL 434/NRSC 434.

NRSC 450/VIBS 450 Mammalian Functional Neuroanatomy
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Functional morphology of the domestic animal and human brain using gross specimens, microscopic sections, interactive computer-, DVD-, and video-assisted instructional programs supplemented with clinical case studies.
Prerequisites: Junior or senior classification; BIMS, biology, biochemistry, or psychology majors, or neuroscience minors with overall 3.5 TAMU GPA; or approval of instructor.
Cross Listing: VIBS 450/NRSC 450.

NRSC 485 Directed Studies
Credits 1 to 3. 1 to 3 Other Hours.
Directed readings or research problems in selected areas designed to supplement existing course offerings. Individual report required.
Prerequisite: Approval of instructor.

NRSC 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Special Topics in... Selected topics in an identified area of neuroscience. May be repeated for credit.
Prerequisite: Approval of instructor.

NRSC 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of a faculty member in neuroscience. May be repeated 3 times for credit.
Prerequisites: Junior or senior classification and approval of instructor.

NRSC 601/BIOL 627 Principles of Neuroscience I
Credits 3. 3 Lecture Hours.
Detailed introduction to the basic fundamentals of cellular and molecular neuroscience; topics include membrane potentials, action potential generation, and the mechanisms underlying synaptic transmission, as well as their molecular basis.
Prerequisites: Graduate classification or approval of instructor.
Cross Listing: BIOL 627/NRSC 601.

NRSC 602 Principles of Neuroscience II
Credits 3. 3 Lecture Hours.
Fully integrated overview of nervous system organization and systems-level neurobiology; broad topics include sensory systems and sensory systems function, motor systems and neuromuscular function, central pattern generation and locomotion, homeostatic regulation, motivation, emotions, learning and memory, and circadian rhythms. 
Prerequisites: Graduate classification or approval of instructor.
Cross Listing:: BIOL 628/NRSC 602.

NRSC 603/VIBS 603 Neuroanatomy
Credits 4. 2 Lecture Hours. 6 Lab Hours.
Gross, developmental and microscopic anatomy of nervous system of selected laboratory and domestic animals.
Prerequisite: Approval of instructor.
Cross Listing: VIBS 603/NRSC 603.

NRSC 604/VIBS 604 Biomedical Neuroendocrinology and Endocrine Disorders
Credits 3. 3 Lecture Hours.
Prerequisite: Approval of instructor.
Cross Listing: VIBS 604/NRSC 604.

NRSC 605/VIBS 605 Neuroanatomical Systems
Credits 3. 3 Lecture Hours.
Emphasis on major neural systems that govern identifiable physiological functions, behavior and neurodegenerative disease; whole-brain anatomy is approached from a “systems” perspective, wherein components of defined functional systems are described in terms of their location, inputs and outputs, and physiological/behavioral significance in health and disease.
Prerequisite: Approval of instructor.
Cross Listing: VIBS 605/NRSC 605.

NRSC 606/PSYC 606 Learning
Credits 3. 3 Lecture Hours.
Procedural and theoretical issues in study of basic learning mechanisms in animals and humans, including Pavlovian and instrumental conditioning. Application of this work to other domains and relevant biological mechanisms also discussed.
Prerequisites: PSYC 340/NRSC 340 or approval of instructor.
Cross Listing: PSYC 606/NRSC 606.

NRSC 609/PSYC 609 Physiological Psychology
Credits 3. 3 Lecture Hours.
Current research and methodological procedures on physiological bases of sensation-perception, memory and learning, arousal-sleep attention, emotions and motivation.
Prerequisite: PSYC 335/NRSC 335.
Cross Listing: PSYC 609/NRSC 609.

NRSC 611 Molecular Biology of Differentiation and Development
Credits 3. 3 Lecture Hours.
Major paradigms of eukaryotic gene regulation in terms of the role of gene expression during ontogeny and the effect of dysfunction in these processes on the neoplastic state.
NRSC 615/PSYC 615 Perceptual Processes
Credits 3. 3 Lecture Hours.
Perpetual Processes. Complex sensory and perceptual phenomena with emphasis on the relationship between perception and motivation, cognition, creativity and instinctive/ethological; learning/experiential factors in higher level perceptual processes.
Cross Listing: PSYC 615/NRSC 615.

NRSC 616/VIBS 616 Advanced Developmental Neurotoxicology
Credits 3. 3 Lecture Hours.
(3-0) Study of mechanisms of toxicity of substances potentially devastating to the developing brain and spinal cord including lead, mercury and other heavy metals, alcohol, nicotine (smoking), pesticides, flame retardants and others.
Prerequisite: Graduate classification or approval of instructor.
Cross Listing: VIBS 616.

NRSC 621/VIBS 621 Functional Neuroanatomy
Credits 4. 4 Lecture Hours.
A comprehensive review of the neuroanatomical determinants of function; rigorous neuroanatomical foundation relevant for research investigating changes in neural pathways and/or networks involved in sensory and motor functions, learning and memory, perception, selective attention, as well as recovery of function following brain damage.
Cross Listing: VIBS 621/NRSC 621.

NRSC 633 Neuropsychopharmacology
Credits 4. 4 Lecture Hours.
Interaction of drugs and toxins with neurotransmitter systems with primary emphasis on mechanisms involving receptor function that impacts central nervous system integration.
Prerequisite: Approval of course coordinator.

NRSC 634/BIOL 634 Comparative Neurobiology
Credits 3. 3 Lecture Hours.
Cellular, molecular and systems neurobiology, together with neuroethology. A comparative approach to subject matter is stressed. Topics such as evolution of nervous systems and their diverse structure and complex functions are dealt with.
Cross Listing: BIOL 634/NRSC 634.

NRSC 635/BIOL 601 Biological Clocks
Credits 3. 3 Lecture Hours.
Introduction to the formal properties of biological rhythms; cellular and molecular bases for rhythmicity; temporal adaptations of organisms using clocks.
Prerequisites: Graduate classification or approval of instructor.
Cross Listing: BIOL 601/NRSC 635.

NRSC 636/BIOL 615 Signaling in Behavior and Development
Credits 3. 3 Lecture Hours.
Will focus on signaling pathways used in multicellular animals. In each lecture, major signaling pathways used in behavior, physiology, and development will be introduced at the molecular level, and then be discussed in the context of organismal biology.
Prerequisite: Graduate classification.
Cross Listing: BIOL 615/NRSC 636.

NRSC 640/VIBS 640 Neurobiology
Credits 1 to 5. 1 to 5 Lecture Hours.
Biological of the mammalian central nervous system with emphasis on cellular and molecular interactions; contemporary research topics in areas such as neuron-glia interactions, neuroimmunology, neuroendocrinology, developmental neurobiology and neurogenetics; extensive readings from primary literature.
Prerequisites: Undergraduate or graduate cell biology, genetics and biochemistry or approval of instructor.
Cross Listing: VIBS 640/NRSC 640.

NRSC 641 Principles of Neuropsychology
Credits 3. 3 Lecture Hours.
Review of major areas of cognitive functioning including concentration, memory, language, visuospatial/construction skills and executive functions; review of neurobehavioral syndromes including dementia, epilepsy, head injury, stroke, drug toxicity, etc.; assessment of deficits associated with disorders.
Prerequisites: PSYC 624 or PSYC 627 or equivalent as approved by instructor.

NRSC 644/BIOL 644 Neural Development
Credits 3. 3 Lecture Hours.
Classical and current research literature to explore the major events in the development of a nervous system, including topics ranging from neurogenesis to synapse information.
Prerequisite: Graduate classification.
Cross Listing: BIOL 644/NRSC 644.

NRSC 649/PSYC 649 Seminar in Behavioral Neuroscience
Credits 3. 3 Lecture Hours.
Behavioral neuroscience; including behavioral pharmacology, neuropsychopharmacology, methods and techniques, drug reinforcement, behavioral toxicology, pain-perception and ingestive behavior. May be repeated up to three times for credit.
Prerequisite: PSYC 606/NRSC 606 or equivalent; PSYC 609/NRSC 609; graduate classification.
Cross Listing: PSYC 649/NRSC 649.

NRSC 650/PSYC 650 Clinical Psychopharmacology
Credits 3. 3 Lecture Hours.
Survey of topics in clinical psychopharmacology, including pharmacodynamics, major neurotransmitter systems, and therapeutic applications and limitations.
Prerequisite: Graduate classification or approval of instructor.
Cross Listing: PSYC 650/NRSC 650.

NRSC 671/PSYC 671 Experimental Design for Behavioral Scientists
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Intensive practical study of designs of special interest to behavioral scientists; repeated measures designs.
Prerequisites: STAT 652 or equivalent.
Cross Listing: PSYC 671/NRSC 671.

NRSC 681 Seminar
Credits 1 to 3. 1 to 3 Other Hours.
Presentation of current research in neuroscience and related areas. May be taken 4 times for credit.
Prerequisite: Graduate classification.

NRSC 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed individual study of selected problems in the field of neuroscience.
Prerequisites: Graduate classification and approval of department head.
NRSC 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of neuroscience. May be repeated for credit.
Prerequisite: Graduate classification.

NRSC 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research in neuroscience for thesis or dissertation credit.
Prerequisite: Graduate classification.

NRSC 698/BIOL 698 Behavior, Genes, and Evolution
Credits 3. 3 Lecture Hours.
Introduces an integrative approach to the study of animal behavior, complementing evolutionary and ecological perspectives with molecular and genetic approaches and methodologies.
Prerequisite: Graduate classification.
Cross Listing: BIOL 698/NRSC 698.

NUEN - Nuclear Engineering

Courses

NUEN 101 Principles of Nuclear Engineering
Credit 1. 1 Lecture Hour.
Introduction to nuclear engineering including global and national energy requirements, radioactivity, radiation protection, and fission and fusion reactor concepts.

NUEN 201 Introduction to Nuclear Engineering I
Credits 3. 3 Lecture Hours.
Atomic and nuclear physics discoveries that have led to the development of nuclear engineering, atomic models, relativity, x-rays, types of nuclear reactors; problem solving techniques.
Prerequisite: MATH 251 or registration therein; PHYS 208.

NUEN 265 Materials Science for Nuclear Energy Applications
Credits 3. 3 Lecture Hours.
Materials science fundamentals with an emphasis on nuclear applications; topics will include bonding, crystal structures crystalline defects, mechanical properties and radiation effects in metal, ceramic and polymer materials.
Prerequisites: CHEM 102, or CHEM 104 and CHEM 114, or CHEM 107; PHYS 218.

NUEN 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Special Topics in... Selected topics in an identified area of nuclear engineering. May be repeated for credit.
Prerequisite: Approval of department head.

NUEN 301 Nuclear Reactor Theory
Credits 3. 3 Lecture Hours.
An introduction to neutron diffusion theory, neutron moderation, conditions for criticality of nuclear reactors.
Prerequisites: NUEN 302.

NUEN 302 Introduction to Nuclear Engineering II
Credits 3. 3 Lecture Hours.
Basic radioactivity, nuclear and neutron physics as applied to nuclear engineering.
Prerequisites: NUEN 201; MATH 308 or registration therein.

NUEN 303 Nuclear Detection and Isotope Technology Laboratory
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Interaction of radiation with matter; behavior of various nuclear radiation detectors studied both theoretically and experimentally in laboratory; properties of radionuclides useful to industry considered and evaluated from engineering point of view; writing intensive course.
Prerequisites: NUEN 309/SENG 309; ECEN 215.

NUEN 304 Nuclear Reactor Analysis
Credits 3. 3 Lecture Hours.
The group diffusion method, multi-region reactors, heterogeneous reactors, reactor kinetics, changes in reactivity.
Prerequisite: NUEN 301; MATH 309.

NUEN 309/SENG 309 Radiological Safety
Credits 3. 3 Lecture Hours.
Interactions of nuclear radiations with matter and biological systems; theory and practice of radiation dosimetry as applied to radiation protection; design and application of radiation dosimetry systems for personnel monitoring, area radiation monitoring and accident situation; includes external and internal dosimetry as well as long-term risk analysis.
Prerequisite: NUEN 302.
Cross Listing: SENG 309/NUEN 309.

NUEN 329 Analytical and Numerical Methods
Credits 3. 3 Lecture Hours.
Introduction to use of numerical analysis and advanced analytical techniques for obtaining nuclear reactor flux distributions, temperatures and transients; use of digital computer in obtaining nuclear reactor design information.
Prerequisites: MATH 309 and NUEN 301.

NUEN 405 Nuclear Engineering Experiments
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Experimental measurements of basic nuclear reactor parameters; reactor operation and reactor safety.
Prerequisites: NUEN 303; NUEN 304 or senior classification.

NUEN 406 Nuclear Engineering Systems and Design
Credits 3. 3 Lecture Hours.
Nuclear plant systems; conventional and advanced generation power reactors, nuclear simulators, transient analysis using available software for reactor simulators; nuclear engineering design methodology; problem formulation, criteria, trade-off decisions and design optimization; case studies.
Prerequisite: NUEN 304; MEEN 461 or approval of instructor.

NUEN 410 The Design of Nuclear Reactors
Credits 4. 4 Lecture Hours.
Application of reactor theory and other engineering disciplines in fundamental and practical design of nuclear reactor systems for power applications; use of computer in design operations.
Prerequisites: NUEN 304 and NUEN 406; MEEN 461.

NUEN 417/MEEN 417 Basics of Plasma Engineering and Applications
Credits 3. 3 Lecture Hours.
Basic plasma properties and confinement techniques; single particle orbits in electric and magnetic fields, moments of Boltzmann equation and introduction to fluid theory; wave phenomena in plasmas and introduction to plasma kinetic theory; analysis of laboratory plasmas and plasma applications including fusion, electric propulsion, materials processing and plasma enhanced chemistry.
Prerequisite: PHYS 208 or equivalent; senior classification in nuclear, mechanical, or aerospace engineering, physics, or approval of instructor.
Cross Listing: MEEN 417/NUEN 417.
NUEN 418 Fuel Assembly and 3-D Reactor Core Design and Modeling Credits 3. 3 Lecture Hours.
Application of state-of-the-art engineering-grade codes in the neutronic design, analysis and modeling of nuclear fuel assembly and core.
Prerequisites: NUEN 304 and junior or senior classification.

NUEN 430 Computer Applications in Nuclear Engineering Credits 3. 3 Lecture Hours.
Applications of digital computers to solve nuclear engineering problems; nuclear data and cross-section libraries; deterministic methods for linear and non-linear nuclear systems, and Monte Carlo methods for linear nuclear systems.
Prerequisites: NUEN 304, NUEN 329.

NUEN 431 Technical Communications Issues in the Nuclear Industries Credit 1. 1 Lecture Hour.
Introduction to a variety of topics that present communication challenges; opportunities to learn from a variety of visiting experts concerning the nuances and challenges of, as well as successful methods for, communicating with concerned audiences about technically challenging topics.
Prerequisite: Junior or senior classification or approval of instructor.

NUEN 432 Nuclear Power Plant Fundamentals Credits 3. 3 Lecture Hours.
Understanding the operation of a nuclear electric general station; includes reactor water chemistry, material science, electrical science; mechanical science, civil engineering for nuclear power plant engineers, and digital process control systems.
Prerequisite: Junior or senior classification in the college of engineering; non-NUEN majors.

NUEN 433 Nuclear Power Plant Systems – Pressurized Water Reactor Credits 3. 3 Lecture Hours.
Principal elements of pressurized water reactor nuclear power systems; overview of reactor physics, thermodynamics, and heat transfer; focus on systems with both function and interfaces stressed throughout; includes basic reactor physics, reactor heat generation, reactor plant systems; support systems, and reactor safety.
Prerequisites: NUEN 431 and junior or senior classification in the college of engineering; non-NUEN majors.

NUEN 434 Nuclear Power Plant Systems – Boiling Water Reactor Credits 3. 3 Lecture Hours.
Principal elements of boiling water reactor nuclear power systems; overview of reactor physics, thermodynamics, and heat transfer; focus on systems with both function and interfaces stressed throughout; includes basic reactor physics, reactor heat generation, reactor plant systems; support systems, and reactor safety.
Prerequisites: NUEN 431 and junior or senior classification in the college of engineering; non-NUEN majors.

NUEN 435 Nuclear Power Plant Operations Credits 4. 3 Lecture Hours. 3 Lab Hours.
Overview of mass, momentum and energy conservation as it relates to nuclear power plants; includes coupled neutron/thermal models to study plant operations semi-quantitatively achieving an integrated plant understanding.
Prerequisites: NUEN 431, and NUEN 432 or NUEN 433; junior or senior classification in the college of engineering, non-NUEN majors.

NUEN 436 Human Performance for Nuclear Power Plant Engineers Credits 2. 2 Lecture Hours.
Six modules: human performance fundamentals, the organization and the processes, the individual worker, the engineer, corrective action programs and root cause analysis, and case studies including TMI-2, Chernobyl, Davis-Besse, and Fukushima Daiichi.
Prerequisites: NUEN 432; junior or senior classification in the college of engineering.

NUEN 451 Nuclear Security System Design Credits 3. 3 Lecture Hours.
The science and engineering associated with the design, evaluation and implementation of systems to secure nuclear and radiological materials; adversary characterization, categorization of nuclear and radiological targets, calculation of consequences associated with failure to protect targets, detection and delay technologies, and mathematical methods for evaluation and managing risk.
Prerequisites: NUEN 303 and NUEN 309/SENG 309 or equivalent, or approval of instructor.

NUEN 460 Nuclear Plant Systems and Transients Credits 3. 3 Lecture Hours.
Use of engineering principles to elucidate the nuclear, mechanical, electrical and functional interactions among nuclear plant components and systems; reactor protection systems, alarm and trip setpoints, normal and accident transients. Components studied in detail include: core, control rod drive mechanism, neutron source, neutron detectors, primary coolant system, and emergency core cooling system.
Prerequisites: NUEN 301, NUEN 302, NUEN 304, NUEN 406, NUEN 430 or equivalents; MEEN 315, MEEN 344, MEEN 461 or equivalents; junior or senior classification.

NUEN 465 Nuclear Materials Engineering Credits 3. 3 Lecture Hours.
Explore applications of materials science principles in nuclear energy systems; includes crystal structures and defects, metallurgy, and materials thermochemistry; emphasis on nuclear fuel performance, structural material changes, and waste materials; laboratory demonstrations on materials behavior.
Prerequisites: NUEN 265, MEEN 222 or equivalent and NUEN 302.

NUEN 475 Environmental Nuclear Engineering Credits 3. 3 Lecture Hours.
Environmental aspects of nuclear power; natural radiation environment and the distribution of radioactivity added to the environment by human activities; evaluation of effects of radiation and radioactivity on the environment and on humans.
Prerequisite: NUEN 309/SENG 309.

NUEN 479 Radiation Protection Engineering Credits 3. 2 Lecture Hours. 3 Lab Hours.
Analysis of radiation hazard situations and design of nuclear facilities from a safety standpoint.
Prerequisite: NUEN 475.

NUEN 481 Seminar Credit 1. 1 Lecture Hour.
Designed to broaden the student's capability, performance and perspective in nuclear engineering through faculty, student and guest presentations.
Prerequisite: NUEN 410 or registration therein or NUEN 479 or registration therein.
NUEN 485 Directed Studies  
Credits 1 to 6. 1 to 6 Other Hours.  
Problems of limited scope approved on an individual basis intended to promote independent study; program enrichment for capable students; results presented in writing to staff.  
**Prerequisites:** Junior or senior classification and approval of department head.

**NUEN 489 Special Topics in...**  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified area of nuclear engineering. May be repeated for credit.  
**Prerequisite:** Approval of instructor.

**NUEN 491 Research**  
Credits 1 to 4. 1 to 4 Other Hours.  
Research conducted under the direction of a faculty member in Nuclear Engineering. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.  
**Prerequisites:** Junior or senior classification and approval of instructor.

**NUEN 601 Nuclear Reactor Theory**  
Credits 3. 3 Lecture Hours.  
Neutron-nucleus interactions; neutron energy spectra; transport and diffusion theory; multigroup approximation; criticality calculations; cross-section processing; buildup and depletion calculations; modern reactor analysis methods and codes.  
**Prerequisite:** Approval of instructor.

**NUEN 604 Radiation Interactions and Shielding**  
Credits 3. 3 Lecture Hours.  
Basic principles of radiation interactions and transport, especially as related to the design of radiation shields. Radiation sources, nuclear reactions, radiation transport, photon interactions, dosimetry, buildup factors and fast neutron shielding.  
**Prerequisites:** NUEN 302 or equivalent; MATH 308; BS in engineering or physical sciences.

**NUEN 605 Radiation Detection and Nuclear Materials Measurement**  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Laboratory-based course studying the fundamentals of nuclear materials measurements; advanced radiation detection instrumentation with a specific focus on measuring nuclear materials (uranium, plutonium, and other actinides); nuclear material measurements include detection, identification, and quantification of the materials in a fuel cycle facility and in the field.  
**Prerequisite:** Graduate classification.

**NUEN 606 Reactor Analysis and Experimentation**  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Perturbation theory; delayed neutrons and reactor kinetics; lattice physics calculations; full core calculations; analysis and measurement of reactivity coefficients; analysis and measurement of flux distribution; analysis and measurement of rod worths; critical and subcritical experiments.  
**Prerequisite:** Approval of instructor.

**NUEN 609 Nuclear Reactor Safety**  
Credits 3. 3 Lecture Hours.  
Analysis and evaluation applied to reactor design for accident prevention and mitigation; protective systems and their reliability, containment design, emergency cooling requirements, reactivity excursions and the atmospheric dispersion of radioactive material; safety problems associated with light-water power reactors and proposed fast reactor systems.  
**Prerequisites:** NUEN 601 and NUEN 623 or approval of instructor.

**NUEN 610 Design of Nuclear Reactors**  
Credits 4. 4 Lecture Hours.  
Application of fundamentals of nuclear physics and reactor theory with engineering fundamentals to design of nuclear reactors.  
**Prerequisites:** NUEN 602 or registration therein; NUEN 410 or approval of instructor.

**NUEN 611 Radiation Detection and Measurement**  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Interactions of radiation with matter behavior of various nuclear radiation detectors studied both theoretically and experimentally in the laboratory; properties of radionuclides useful to industry and medicine considered and evaluated from an engineering point of view.  
**Prerequisite:** Graduate classification, enrollment in NUEN 613 or instructor approval.

**NUEN 612 Radiological Safety and Hazards Evaluation**  
Credits 3. 3 Lecture Hours.  
State and Federal regulations concerning radioactive materials; radiation safety as applied to accelerators, nuclear reactors, medical therapy and diagnostic devices, and radioactive byproducts; rigorous methods of analysis applied to computation of biological radiation dose and dose rates from various sources and geometries; radiation effects on physical systems.  
**Prerequisites:** NUEN 613; MATH 308.

**NUEN 613 Principles of Radiological Safety**  
Credits 3. 3 Lecture Hours.  
Rigorous mathematical and physical approach to various aspects of radiological safety; derivation of equations involving radiation absorption, radiation dosimetry and calculations of radiation dose due to internal emitters; mathematical models relating to radionuclide concentrations in tumor, normal tissue, air or water to whole body dose.  
**Prerequisite:** NUEN 409.

**NUEN 614 Probabilistic Risk Assessment Techniques in Nuclear Systems**  
Credits 3. 3 Lecture Hours.  
Current and proposed techniques for determining the reliability of nuclear plant systems and the risk associated with the operation of these advanced technology systems.  
**Prerequisites:** NUEN 612 and NUEN 613.

**NUEN 615 Theory and Applications of Microdosimetry**  
Credits 3. 3 Lecture Hours.  
Theory, measurement, and calculation of microdosimetric spectra; practical applications of microdosimetry in the determination of absorbed dose distribution within tissue, the statistical fluctuations of absorbed dose at the cellular and subcellular level, and the impact of microdosimetry on radiation protection guidelines.  
**Prerequisite:** NUEN 613.

**NUEN 618 Multiphysics Computations in Nuclear Science and Engineering**  
Credits 3. 3 Lecture Hours.  
Tightly coupled multiphysics simulation techniques and application to typical problems arising in nuclear science and engineering (reactor dynamics and safety transients, conjugate heat transfer, radiative transfer, fluid structure interaction).  
**Prerequisites:** MATH 609 and NUEN 606.
NUEN 623 Nuclear Engineering Heat Transfer and Fluid Flow
Credits 3.3 Lecture Hours.
Thermodynamics and unified treatment of mass, momentum and energy transport with applications to nuclear engineering systems; velocity and temperature distributions in laminar and turbulent flow; flow and thermal stability.
**Prerequisites:** MEEN 334, MATH 346 or MATH 461 and MATH 601 or registration therein or approval of instructor.

NUEN 624 Nuclear Thermal Hydraulics and Stress Analysis
Credits 3.3 Lecture Hours.
Unified treatment of advanced heat transport in solids and fluids including boiling phenomena; thermal stress phenomena with applications to nuclear sources; isothermal elasticity; thermoelasticity; viscoelasticity; plasticity.
**Prerequisites:** NUEN 623 or equivalent; MATH 601 or registration therein.

NUEN 625 Neutron Transport Theory
Credits 4.4 Lecture Hours.
Analytical treatment of neutron transport theory; solution methods of integrodifferential and integral Boltzmann equations, adjoints; energy dependent methods using singular eigenfunctions, variational methods, orthogonal polynomials and thermalization; current analytical techniques in transport theory.
**Prerequisites:** NUEN 606; MATH 602.

NUEN 627 Radiation-Hydrodynamics
Credits 3.3 Lecture Hours.
Coupling of the Euler equations of compressible fluid dynamics with the equations of thermal radiation transport; the equilibrium-diffusion limit; radiative shock waves; and numerical methods for one-dimensional calculations.
**Prerequisite:** MATH 602.

NUEN 629 Numerical Methods in Reactor Analysis
Credits 4.4 Lecture Hours.
Solution of variable dimension multigroup discrete representation problems including Sn, Pn, An, variational and Monte Carlo techniques; techniques in reactor kinetics, fuel cycle and optimization.
**Prerequisites:** NUEN 430; NUEN 606 or equivalent.

NUEN 630 Monte Carlo Methods for Particle Transport
Credits 3.2 Lecture Hours. 2 Lab Hours.
Principles of Monte Carlo method; random number generation; random variable sampling; particle tracking; statistical error estimation; ACE format cross-sections; introduction to MCNP code; MCNP applied to radiation shielding, criticality safety, reactor physics and detector modeling; MCNP output analysis, statistical tests, and tallying procedures; variance reduction techniques; Monte Carlo algorithm development.
**Prerequisites:** Approval of Instructor, MCNP/MCNPX code single user license from RSICC, ORNL, USA.

NUEN 633 Radiation Measurements and Calibrations
Credits 3.3 Lecture Hours.
Measurement of radiation dose and protection quantities in realistic radiation fields will be studied; specific characteristics of radiation sources will be discussed in the context of accurate measurement and radiation protection; examples from a wide variety of radiation environments will illustrate radiation measurement requirements for medical, industrial, and research sources.
**Prerequisite:** NUEN 613.

NUEN 640 Severe Accident Analysis of Nuclear Facilities
Credits 3.3 Lecture Hours.
Severe accident phenomena from initial fuel heat up to the source term; complexity of accident progression and safety issues; severe accident codes with respect to the modeling philosophy, techniques, assumptions and limitations; development of skills in analysis methodologies/techniques.
**Prerequisite:** Graduate classification in the college of engineering or approval of instructor.

NUEN 644/MEEN 644 Numerical Heat Transfer and Fluid Flow
Credits 3.3 Lecture Hours.
Convection-diffusion, up-wind, exponential, exact solution, power law schemes, false diffusion; staggered grid concept; development of simple and simpler algorithms; periodically developed flows.
**Prerequisites:** NUEN 430 or equivalent; MEEN 357 and MEEN 461.
**Cross Listing:** MEEN 644/NUEN 644.

NUEN 646 Fundamentals of Space Life Sciences
Credits 3.3 Lecture Hours.
Integrates nutrition, physiology, and radiation biology to define major biological problems in long duration space flight; provide an overview of the problems of bone loss, muscle wasting, and radiation-enhanced carcinogenesis along with potential countermeasures; focus on nutritional interventions and exercise protocols.
**Cross Listing:** NUTR 646 and KINE 646.

NUEN 650 Nuclear Nonproliferation and Arms Control
Credits 3.3 Lecture Hours.
Studies the political and technological issues associated with nuclear proliferation and arms control; history of arms control treaties and verification, proliferation resistance in the nuclear fuel cycle, international and domestic safeguards, material accountancy, containment and surveillance, and physical protection.
**Prerequisite:** NUEN 601.

NUEN 651 Nuclear Fuel Cycles and Nuclear Material Safeguards
Credits 3.3 Lecture Hours.
Study of civilian and military nuclear fuel cycles and application of nuclear material safeguards to secure these cycles; topics include the physics of the fundamental fuel cycle components; the application of nuclear material measurements systems; and the technical and legal basis for material protection, control and accounting systems.
**Prerequisite:** NUEN 601 or equivalent.

NUEN 655 Critical Analysis of Nuclear Security Data
Credits 4.4 Lecture Hours.
A project-based course studying the analysis of nuclear security events, threats, and data; assigned project requires an analysis of data for a hypothetical case of interest to U.S. national security; focuses on detailed technical analysis using diverse datasets and country/organization profiles.
**Prerequisites:** NUEN 650, NUEN 601 or equivalent.

NUEN 661 Nuclear Fuel Performance
Credits 3.3 Lecture Hours.
Reviews basic phenomena that govern nuclear fuel performance; includes structural changes and rate controlling phenomena for oxide and metal fuels as well as cladding and other structural materials.
**Prerequisites:** Graduate classification or consent of the instructor.
NUEN 662 Nuclear Materials Under Extreme Conditions
Credits 3.3 Lecture Hours.
Fundamentals of materials degradation under reactor environments; linkage from radiation induced microstructure changes to materials thermal properties, mechanical properties, corrosion resistance, swelling, creep, and overall integrities; materials issues of nuclear fuel, cladding, out-core structural components and waste storage managements.
Prerequisite: Graduate classification or approval of instructor.

NUEN 663 Fundamentals of Ion Solid Interactions
Credits 3.3 Lecture Hours.
Fundamentals of neutron and ion interactions with solid state materials, and subsequent damage cascade formation, defect clustering, and structural changes; electronic stopping and nuclear stopping mechanisms based on classic and quantum mechanics treatments; development of basic modeling capabilities to carry out simulations for relevant research topics.
Prerequisite: Graduate classification or approval of instructor.

NUEN 669/INTA 669 Nuclear Terrorism Threat Assessment and Analysis
Credits 3.3 Lecture Hours.
Study the manner in which we conduct threat assessments and the analysis of non-state actors in the fields of nuclear and radiological security; examine the history of threats and security issues in an effort to better understand terrorist groupings, their motivations and attack methodologies.
Prerequisite: Graduate classification.
Cross Listing: INTA 669/NUEN 669.

NUEN 670 Introduction to Radiotherapy Physics
Credits 4.3 Lecture Hours. 4 Lab Hours.
Examination of radiation physics necessary for understanding modern radiation therapy; perform theoretical foundations of physical dose calculation for megavoltage energy photons and electrons, biological predictions of therapy outcomes, and brachytherapy; methods of modeling and implementing radiation therapy treatment includes planning, evaluation, and delivery; emphasis on intensity modulated radiation therapy and TomoTherapy.
Prerequisites: Graduate classification; NUEN 613 or approval from academic advisor.

NUEN 671/BMEN 672 Introduction to Diagnostic Radiology Physics
Credits 3.2 Lecture Hours. 3 Lab Hours.
Concepts of radiation physics used in diagnostic radiology; introduction to the theory behind the different imaging modalities as it relates to mammography, planar X-ray imaging, computed tomography (CT), single photon emission tomography (SPECT), and positron emission tomography (PET).
Prerequisite: NUEN 611, NUEN 613 or approval of academic advisor.
Cross Listing: BMEN 672/NUEN 672.

NUEN 673 Radiation Biology
Credits 3.3 Lecture Hours.
Response of biological systems to ionizing radiation at the molecular, cellular, tissue and organismal levels; effects of different doses and dose rates with emphasis on the underlying mechanisms relevant to accidental, environmental and medical exposures.
Prerequisite: NUEN 409 or graduate classification.

NUEN 674 Radiation Carcinogenesis
Credits 3.3 Lecture Hours.
Examines the experimental models and mathematical simulations for the investigation of radiation-induced cancer, the current scientific literature concerning the intersection of risk analysis and the interpretation of disparate data from varied biological systems.
Prerequisite: Graduate classification.

NUEN 675 Internal Dose Techniques
Credits 3.3 Lecture Hours.
Current and proposed techniques for assessing the absorbed dose due to internally deposited radionuclides; techniques recommended for international and national bodies, as well as those used in nuclear medicine.
Prerequisites: NUEN 612 and NUEN 613.

NUEN 676 Radiation Physics Instrumentation
Credits 3.1 Lecture Hour. 6 Lab Hours.
Advanced course in instrumentation intended for radiation professionals and researchers; provides an in-depth knowledge of the components of radiation monitoring and measurement systems; includes quality assurance and quality control concepts for the safe and efficient use of radiation sources.
Prerequisite: NUEN 402.

NUEN 677/MEEN 677 Aerosol Science
Credits 3.3 Lecture Hours.
Multidisciplinary survey of methods for describing aerosol particles and systems: gas kinetics and transport theory, formation and growth thermodynamics, electrical properties, coagulation, light scattering; selected topics from current literature.
Prerequisite: Graduate classification in engineering or approval of instructor.
Cross Listing: MEEN 677/NUEN 677.

NUEN 678 Waste Management in the Nuclear Industry
Credits 3.3 Lecture Hours.
Management of radioactive, hazardous and mixed waste generated by all segments of the nuclear fuel cycle and users of radioisotopes; includes treatment, storage and disposal technologies and the political and socioeconomic issues; evaluation of current practices and regulations using a holistic approach.
Prerequisites: Graduate classification and approval of instructor.

NUEN 681 Seminar
Credit 1.1 Lecture Hour.
Topics in nuclear engineering and health/medical physics not covered by formal coursework; whenever possible, guest lectures will discuss topics which they have personally investigated.
Prerequisite: Graduate classification.

NUEN 684 Professional Internship
Credits 1 to 6. 1 to 6 Other Hours.
Training under the supervision of practitioners in settings appropriate to the student’s professional objectives.
Prerequisites: Approval of chair of student’s advisory committee and department head.

NUEN 685 Directed Studies
Credits 1 to 12. 1 to 12 Other Hours.
Offered to enable students to undertake and complete limited investigations not within their thesis research and not covered by any other courses in curriculum.
Prerequisite: Graduate classification.
NUEN 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of nuclear engineering. May be repeated for credit.
Prerequisite: Approval of instructor.

NUEN 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research toward thesis or dissertation.

NURS - Nursing

Courses

NURS 301 Nursing Foundation
Credits 2. 1 Lecture Hour. 1 Lab Hour.
Introduction to nursing skills including such activities as safety, assessment of vital signs, comfort measures, assistance with daily living activities, environmental concerns, positioning and transporting. We will become familiar with the nursing process, communication and documentation tools. An introduction to the simulation center is highlighted in this class. Orientation to clinical sites and expectations for clinical rotation, as well as mandatory clinical site requirements will be completed.
Prerequisites: Admission to the BSN program or approval from the Associate Dean for Academic Affairs.

NURS 305 Nursing Dimensions and Informatics
Credits 3. 3 Lecture Hours.
This course explores the concepts of informatics and professional dynamics in nursing. Basic computer competencies essential to nursing are introduced, along with skills required to locate and evaluate information (info literacy), and process and communicate findings (info management) related to evidence-based nursing practice. The roles and behaviors of the professional nurse are also introduced. The influence of ethics and cultural/society issues on the nursing profession are explored as well as opportunities for personal and professional development.
Prerequisites: Admission to the BSN program or approval from the Associate Dean for Academic Affairs.

NURS 312 Introduction to Pathophysiology
Credits 3. 3 Lecture Hours.
An introduction to pathophysiological alterations in major regulatory mechanisms of the body. Provides a foundation for understanding general nursing practice, various diagnostic procedures and selected therapeutic regimens.

NURS 313 Nursing Fundamentals
Credits 5. 3 Lecture Hours. 2 Lab Hours.
(3-2) An introduction to the scope of human needs, utilization of the nursing process as a systematic approach to meeting those needs and the role of the professional nurse in assisting individuals toward optimal health. Clinical settings are utilized in the application of fundamental concepts, principles of nursing and communication skills that are employed in providing basic client care.
Prerequisite: Admission to the BSN Program.

NURS 314 Health Assessment
Credits 3. 1 Lecture Hour. 2 Lab Hours.
Concepts and principles underlying assessment of the health status of individuals are presented. Emphasis is placed on interviewing skills, health histories, and the physical and psychosocial findings in the well person. Development of communication in the nurse-client relationship and assessment skills are included. Students implement the nursing process by obtaining health histories, performing physical and psychosocial assessments, establishing a database, and formulating initial nursing plans.

NURS 315 Nursing and the Aged
Credits 3. 2 Lecture Hours. 1 Lab Hour.
This course presents an overview of age-related changes including physical, emotional, social and environmental transitions in the aging family. Emphasis is placed on developmental patterns and health promotion in the population.

NURS 316 Pharmacology Principles
Credits 3. 3 Lecture Hours.
Focuses on the basic drug classifications, concepts and principles of pharmacology, with special consideration for the nursing role in developing a comprehensive approach to the clinical application of drug therapy through the use of the nursing process. Nursing implications relative to the utilization of drug therapy are examined.

NURS 320 Adult Nursing I
Credits 6. 3 Lecture Hours. 3 Lab Hours.
This course introduces the student to the use of the nursing process in the care of adults with chronic or non-complex illness. The course uses a systems approach to discuss the effects of illness on individual and family, and to examine the disruption of growth and development patterns across the lifespan from young adult to senior years, emphasizing the nursing process to assist adults in reaching their optimal level of wellness. The course includes clinical laboratory to allow the student the opportunity to apply theoretical concepts to clinical practice in diverse adult populations.

NURS 323 Nursing Care of Women, Families and Newborns
Credits 4. 2 Lecture Hours. 2 Lab Hours.
A study of childbearing families and women’s health in normal and high-risk situations. The role of the nurse in meeting health needs of women, families and their newborns is analyzed. Supervised clinical experiences and/or simulation experiences in the application of the nursing process in meeting these health needs are offered. This course promotes acquisition of skills in caring for women, families and newborns during uncomplicated and/or complicated health experiences in a variety of settings.
Prerequisites: NURS 312, NURS 313, NURS 314, NURS 316.

NURS 385 Directed Studies
Credits 1 to 3. 1 to 3 Other Hours.
Individually supervised study in subject matter to be arranged with faculty.
Prerequisite: Admission to the TAMHSC-CON or approval from the associate dean of academic affairs.

NURS 386 Directed Clinical Studies
Credits 1 to 3. 1 to 3 Other Hours.
Individually supervised study focusing on clinical skills in focused areas to be arranged with faculty.
Prerequisite: Admission to the TAMHSC-CON or approval from the associate dean of academic affairs.

NURS 405 Selected Topics in Nursing
Credit 1. 1 Lecture Hour.
A broad introduction to selected topics of current interest in the role of professional nursing.
The purpose of this course is to introduce health professions students to professional and ethical/legal issues in everyday practice in health care, develop self-awareness skills about their own values, and those of others, and provide them with tools to engage in self-reflective practice leading to enhancement of patient-centered care and collaborative team work. 

Prerequisites: Admission to the TAMHSC.
NURS 460 Nursing Dimensions and Informatics for the RN
Credits 3.3 Lecture Hours.
This course is designed to build on the informatics knowledge and skills of the practicing nurse. Emphasis is placed on the application of the ANA Standards for Nursing Informatics and Professional Practice and incorporation of information technology to support patient care and clinical decision-making. The course will assist the students to develop the professional role by incorporation of the philosophy of nursing, nursing theory, and clinical reasoning. The nurse’s role in interprofessional practice will be explored. The influence of ethics and cultural/society issues on the nursing profession are explored as well as opportunities for personal and professional development.

NURS 461 Application of Evidence Based Practice for the RN
Credits 3.3 Lecture Hours.
In this course, the concepts and principles underlying assessment of the health status of culturally diverse individuals are presented. An emphasis is placed on reviewing and renewing cognitive, affective, and psychomotor skills to obtain health histories and discover physical and psychosocial findings in the well person. The role of genetics in family histories is examined. Successful completion of the course requires students to successfully complete a head-to-toe health assessment examination with accurate documentation of the findings.

NURS 462 Pathophysiology and Pharmacology for the RN
Credits 4.4 Lecture Hours.
Students will demonstrate the ability to incorporate the principles of pathophysiology and pharmacology in planning healthcare for individuals across the lifespan.

NURS 463 Health Assessment for the RN
Credits 3.3 Lecture Hours.
In this course, the concepts and principles underlying assessment of the health status of culturally diverse individuals are presented. An emphasis is placed on reviewing and renewing cognitive, affective, and psychomotor skills to obtain health histories and discover physical and psychosocial findings in the well person. The role of genetics in family histories is examined. Successful completion of the course requires students to successfully complete a head-to-toe health assessment examination with accurate documentation of the findings.

NURS 464 Health Promotion Across the Lifespan for the RN
Credits 3.2 Lecture Hours. 1 Lab Hour.
This course emphasizes the role of the nurse in health promotion across multiple settings with diverse populations. The student will apply principles of teaching/learning, case management, and genetics/genomics to improve the health of general and vulnerable populations.

NURS 465 Care of the Older Adult for the RN
Credits 2.2 Lecture Hours.
The student will develop competencies and knowledge necessary for providing care and promote health aging in the older adult.

NURS 466 Community Health for the RN
Credits 5.4 Lecture Hours. 1 Lab Hour.
In this course, students are introduced to community-based health care of culturally diverse populations. The role of the professional nurse as part of an interprofessional team in health promotion, disease prevention, and management of chronic health problems in community settings is explored. Students apply critical reasoning and information technology skills to develop and implement evidence-based projects that positively impact the quality of life of populations. Practicum experiences are individualized.

NURS 466 Community Health for the RN
Credits 5.3 Lecture Hours. 2 Lab Hours.
In this course, theories and principles of human behavior in organizations are examined, including an exploration of leadership roles in professional nursing practice. The role of regulatory agencies in the provision of quality health care is explored. Students will participate in the evaluation and planning for quality improvement using nurse sensitive indicators. The students will discern the nurse’s role in reducing the financial cost of health care. Practicum experiences are individualized.

NURS 467 Leadership and Management for the RN
Credits 5.3 Lecture Hours. 2 Lab Hours.
In this course, theories and principles of human behavior in organizations are examined, including an exploration of leadership roles in professional nursing practice. The role of regulatory agencies in the provision of quality health care is explored. Students will participate in the evaluation and planning for quality improvement using nurse sensitive indicators. The students will discern the nurse’s role in reducing the financial cost of health care. Practicum experiences are individualized.

NURS 468 Professional Practice Issues for the RN
Credits 2.2 Lecture Hours.
Professional practice issues such as those related to political action, socio-legal concerns, cultural diversity, and ethics are explored with an emphasis on the advocacy role of the nurse. The importance of the nurse leader as a role model for continued professional growth through lifelong learning is emphasized.

NURS 469 Special Topics In...
Credits 1 to 4.1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of nursing. May be repeated for credit.
Prerequisites: Admission to the BSN program or approval from the Associate Dean for Academic Affairs.

NURS 501/EDHP 501 Curriculum Design
Credits 3.3 Lecture Hours.
Various models of curriculum development and design based on educational philosophy and professional standards will be investigated. Students will demonstrate knowledge of program development including scope and sequence, curriculum alignment, and mapping. Program development through topic identification and generation of content outlines/syllabi, objectives, and outcome measures are included in this course.

NURS 502/EDHP 502 Assessment and Evaluation in Education
Credits 3.3 Lecture Hours.
Practical and theoretical issues involved in evaluating student performance, teacher performance and educational programs will be explored. Students will explore various means of performance-based assessments applicable to didactic, simulated and clinical learning environments. Students will examine a variety of assessment instruments and strategies and the role each has in the evaluation process. The course will enable students to plan, execute and interpret educational assessments.

NURS 503/EDHP 503 Teaching Strategies
Credits 3.3 Lecture Hours.
Best practices research on instructional pedagogy and adult learning will be examined. The course focuses on recommended principles, concepts and theories used in practice that create effective learning environments. Teaching strategies responsive to diverse learning styles and needs of learners will be explored as well as reflective practices and self-assessment. A variety of practical classroom, simulation and clinical teaching strategies consistent with current evidence will be discussed emphasizing teaching methods using technology.
Cross Listing: EDHP 503/NURS 503.
NURS 504 Teaching Practicum  
**Credits 2. 2 Lab Hours.**  
This course allows the student to synthesize knowledge gained in the education track courses by working with a faculty mentor to actualize the faculty role. The student will implement effective teaching strategies in content/curriculum development, test construction and clinical supervision in a variety of settings. Interprofessional collaborative teaching strategies will be evidence based and promote critical thinking scholarship and innovation.

NURS 508 Advanced Clinical Practicum and Project  
**Credits 4. 4 Lab Hours.**  
This course provides the opportunity for the student to develop advanced clinical proficiency in a population interest or professional role. Using direct or indirect care approaches, the student will develop and implement a plan to improve patient outcomes, utilizing a variety of advanced skills and knowledge including health promotion, wellness management, quality improvement, health care finance, leadership, policy and evidence based practice and informatics. This course will include 105 hours of clinical practice.

NURS 512 Advanced Pathophysiology  
**Credits 3. 3 Lecture Hours.**  
Advanced concepts of pathophysiology of health problems across the lifespan, preparing the student at the level of advanced nursing practice will be emphasized.

NURS 516 Advanced Pharmacology  
**Credits 3. 3 Lecture Hours.**  
Advances Pharmacology. Advanced pharmacotherapeutic principles related to the management of health problems will be presented. The focus is on pharmacologic treatments utilized by the advanced practice nurse.

NURS 520 Advanced Practice Nursing Roles  
**Credits 3. 3 Lecture Hours.**  
Analysis and synthesis of multi-dimensional role and responsibilities of advanced practice nursing.  
**Prerequisite:** NURS 556/HCPI 556.

NURS 521 Diagnostics and Procedures  
**Credits 2. 2 Lecture Hours.**  
Development of knowledge and skills associated with common procedures and diagnostics in primary care; focus on diagnostics and procedures appropriate to the role of the advanced practice nurse including collaborative, ethical, legal and regulatory considerations.

NURS 522 Primary Care of Families I  
**Credits 6. 3 Lecture Hours. 9 Lab Hours.**  
First course of three; advanced knowledge of acute and chronic health problems in the context of family; emphasis on epidemiology, pathology, assessment, diagnosis, therapeutic modalities and evaluation related to health promotion and health problems of adults across the lifespan.  
**Prerequisites:** NURS 512, NURS 553.  
**Corequisite:** NURS 516.

NURS 523 Primary Care of Families II  
**Credits 6. 3 Lecture Hours. 9 Lab Hours.**  
Second course of three; advanced knowledge of acute and chronic health problems in the context of family; emphasis on epidemiology, pathology, assessment, diagnosis, therapeutic modalities and evaluation related to health promotion and health problems of women and children.  
**Prerequisite:** NURS 522.

NURS 524 Primary Care of Families III  
**Credits 6. 3 Lecture Hours. 9 Lab Hours.**  
Third course of three; advanced knowledge of acute and chronic health problems in the context of family; emphasis on epidemiology, pathology, assessment, diagnosis, therapeutic modalities and evaluation related to health promotion and health problems of adults and older adults.  
**Prerequisite:** NURS 523.

NURS 525 Primary Care of Families Practicum  
**Credits 4. 12 Other Hours.**  
Culmination and integration of all previous course work; opportunity to continue to master domains and competencies of the family nurse practitioner; addresses professional practice issues needed for transition to the advanced practice nurse role and workforce.  
**Prerequisites:** NURS 524, NURS 554, NURS 521, NURS 520.

NURS 551/HCPI 551 Healthcare Quality Improvement and Informatics  
**Credits 3. 3 Lecture Hours.**  
Overview of health care from the viewpoint of quality improvement and health care informatics; using the science of quality measurement and improvement in conjunction with information science to propose a quality improvement initiative; legal and ethical implications of current trends in information technology and safety.  
**Cross Listing:** HCPI 551.

NURS 552/HCPI 552 Scholarship: Integration and Application  
**Credits 3. 3 Lecture Hours.**  
Integrate theory, evidence, clinical judgment, research and interprofessional perspectives using translational processes to improve patient outcomes; application of available evidence to interdisciplinary clinical practice; identification of gaps in knowledge and development of a spirit of inquiry and lifelong scholarship.  
**Cross Listing:** HCPI 552/NURS 552.

NURS 553 Advanced Health Assessment  
**Credits 3. 2 Lecture Hours. 1 Lab Hour.**  
This course will focus on the application of advanced assessment techniques and skills for comprehensive evaluation of patients across the life span using a common symptom approach. Emphasis will be placed on common deviations from normal assessment findings within the context of holistic practice. The course includes 45 hours of clinical practice.

NURS 554 Clinical Prevention and Population Health  
**Credits 3. 3 Lecture Hours.**  
Leadership skills will be developed in the design of clinical prevention interventions and population based care that promotes health and reduces the risk of chronic illness and disease. The student will plan care that is responsive to unique cultural and ethnic identities, socioeconomic conditions and the needs and values of individuals and populations.

NURS 556/HCPI 556 Leadership and Health Policy II  
**Credits 3. 3 Lecture Hours.**  
The development of skills essential to leadership and policy processes, including communication, collaboration, negotiation, delegation and coordination by applying systems theory and complexity science will be promoted. The student will be prepared to assume a leadership role in the management and evaluation of human, fiscal and physical health resources. Students will develop skills in political efficacy and the ability to improve the systems and population outcomes through the development of health policy.  
**Cross Listing:** HCPI 556/NURS 556.

**NUTR - Nutrition**
Courses

NUTR 202 Fundamentals of Human Nutrition
Credits 3. 3 Lecture Hours.
(BIOL 1322, HECO 1322) Fundamentals of Human Nutrition. Principles of nutrition with application to the physiologic needs of individuals; food sources and selection of an adequate diet; formulation of Recommended Dietary Allowances; nutritional surveillance; for non-nutrition majors only.

NUTR 203 Scientific Principles of Human Nutrition
Credits 3. 3 Lecture Hours.
Chemistry and physiology of proteins, carbohydrates, lipids, vitamins and minerals; their ingestion, digestion, absorption, transport and metabolism. Prerequisite: CHEM 101 and CHEM 111. Majors only.

NUTR 210/FSTC 210 Horizons in Nutrition and Food Science
Credits 2. 2 Lecture Hours.
Introduction to nutrition and food science career opportunities through presentations by nutrition and food science researchers and industry professionals; addresses issues of professionalism including portfolio development, teamwork, and critical thinking skills. Cross Listing: FSTC 210/NUTR 210.

NUTR 211 Scientific Principles of Foods
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Basic principles underlying selection, preparation and preservation of food in relation to quality standards, acceptability and aesthetics. Introduction to composition, nutritive value, chemical and physical properties of foods; introduction to experimental study of foods. Prerequisites: CHEM 101, CHEM 111; NUTR 202 or NUTR 203; sophomore classification or above.

NUTR 222 Nutrition for Health and Health Care
Credits 3. 3 Lecture Hours.
Analysis of nutrition with emphasis on providing a basic understanding of nutrition and its role in disease prevention and treatment. Prerequisites: Approval of instructor; 2.0 GPR in major and overall.

NUTR 285 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Directed study of selected problems in the area of nutrition. Prerequisites: Approval of instructor; 2.0 GPR in major and overall.

NUTR 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of nutrition. May be repeated for credit. Prerequisite: Approval of department head.

NUTR 291 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in nutrition. May be repeated 2 times for credit. Prerequisites: Freshman or sophomore classification and approval of department head.

NUTR 300/FSTC 300 Religious and Ethnic Foods
Credits 3. 3 Lecture Hours.
Understanding religious and ethnic foods with application to product development, production, and nutritional practices; emphasis on different food rules and priorities with attention given to different religious and ethnic groups within the US and around the world. Prerequisites: Junior or senior classification or approval of instructor; basic knowledge of food science and nutrition helpful. Cross Listing: FSTC 300/NUTR 300.

NUTR 301 Nutrition Through Life
Credits 3. 3 Lecture Hours.
Analysis of nutrition with emphasis on human biological needs through stages of the life cycle; biochemical, physiological and anthropometric aspects of nutrition. Prerequisites: NUTR 203; junior classification or approval of department head.

NUTR 303/ANSC 303 Principles of Animal Nutrition
Credits 3. 3 Lecture Hours.
Scientific approach to nutritional roles of water, carbohydrates, proteins, lipids, minerals, vitamins, and other dietary components; emphasis on the comparative aspects of gastrointestinal tracts and on digestion, absorption, and metabolism of nutrients. Prerequisites: ANSC 107 and ANSC 108; CHEM 222 or CHEM 227 or equivalent. Cross Listing: ANSC 303/NUTR 303.

NUTR 304 Food Service Systems Management
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Principles of food service management used in selecting, storing, preparing and serving food in quantity; emphasis on menu planning, quality control, purchasing, equipment and layout/design; application of basic food service systems management principles, including financial planning and personnel issues. Prerequisites: NUTR 203 and NUTR 211, junior or senior classification.

NUTR 365 Nutritional Physiology of Vitamins and Minerals
Credits 3. 3 Lecture Hours.
Fundamental nutritional significance of fat soluble and water soluble vitamins and minerals to human metabolism, cell biology and physiology; micro-nutrient groups as per metabolic function or biochemical and physiological actions; important dietary sources, absorption, storage, metabolism, (bio)chemistry, deficiency and toxicity of individual nutrients in this context and basis of DRIs. Prerequisites: NUTR 203 and NUTR 301; junior or senior classification.

NUTR 404 Nutrition Assessment and Planning
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Methods of determining the nutritional status of individuals; dietary techniques; planning nutritional care including diet modification and/or nutrition support; nutrition counseling. Prerequisites: NUTR 203; NUTR 301; junior classification or approval of department head.

NUTR 405 Nutritional Treatment of Disease
Credits 3. 3 Lecture Hours.
Nutritional intervention in pathological conditions, based on biochemical, physiological and psychological effects of disease state; current research in clinical nutrition. Prerequisites: NUTR 203, NUTR 444; BIOL 319; BICH 410 or concurrent enrollment; senior classification or approval of instructor.

NUTR 410/FSTC 410 Nutritional Pharmacometrics of Food Compounds
Credits 3. 3 Lecture Hours.
Nutritional pharmacokinetics and pharmacodynamics of food compounds; specific examples of toxicological and pharmacological effects of food compounds. Prerequisites: NUTR 202 or NUTR 203 or FSTC 201 or CHEM 222 or CHEM 227 or approval of instructor; junior or senior classification. Cross Listing: FSTC 410/NUTR 410.
NUTR 430 Community Nutrition
Credits 3. 3 Lecture Hours.
Health and nutrition programs, food labeling, cultural food practices, consumer education and marketing.
Prerequisite: NUTR 203.

NUTR 440/FSTC 440 Therapeutic Microbiology: Probiotics and Related Strategies
Credits 3. 3 Lecture Hours.
Topics relevant to alimentary (gastrointestinal) microbiology including: (i) the "normal" intestinal microbiota; (ii) probiotic and prebiotic nutritional supplements; (iii) recombinant pharmabiotics; (iv) gut-associated lymphoid tissue and mucosal immunity; (v) foodborne gastrointestinal pathogens; and (vi) fermented products as functional foods.
Prerequisites: Undergraduate survey course in microbiology or approval of instructor; junior or senior classification.
Cross Listing: FSTC 440/NUTR 440.

NUTR 450 Nutrition and Metabolism of Minerals
Credits 3. 3 Lecture Hours.
The role of minerals in living systems and the exploration of their multitude of functions; chemical properties of minerals and how that relates to function in cells and tissues; consequences of mineral deficiencies based on known functions; insight into experimental approaches used to assess minerals in a living environment.
Prerequisite: NUTR 203. BICH 303 or BICH 410 or approval of instructor.

NUTR 469/FSTC 369 Experimental Nutrition and Food Science Laboratory
Credits 4. 1 Lecture Hour. 6 Lab Hours.
Investigation of nutritional intervention in animal models of metabolic and psychological disorders (e.g. obesity and depression); investigational approaches: behavioral analyses; RNA and protein analyses; reverse transcription PCR.
Prerequisites: CHEM 227; CHEM 237; junior or senior classification or approval of instructor.
Cross Listing: FSTC 369.

NUTR 470 Nutrition and Physiological Chemistry
Credits 3. 3 Lecture Hours.
Fundamentals of physiology, biochemistry and nutrition and their relationship to the organismic and cellular metabolism of animals; biochemical basis of hormonal action.
Prerequisites: NUTR 203; NUTR 301; BICH 410; senior classification or approval of department head.

NUTR 471/FSTC 471 Critical Evaluation of Nutrition and Food Science Literature: Evidence Based Reviews
Credits 3. 3 Lecture Hours.
Evaluation of scientific literature, research methods within the literature, and the quality of scientific studies to produce an evidence-based review in areas specific to nutrition and food science.
Prerequisites: NUTR 202 or NUTR 203 and STAT 302; junior or senior classification; knowledge of technical writing helpful.
Cross Listing: FSTC 471/NUTR 471.

NUTR 481 Seminar
Credit 1. 1 Lecture Hour.
Review of current literature and research in nutrition; oral presentations and critical discussions.
Prerequisite: NUTR 203; NUTR 301; senior classification or approval of department head.

NUTR 485 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Directed study on selected problems in the area of nutrition.
Prerequisites: Junior or senior classification in scientific nutrition or allied area; approval of instructor; 2.0 GPR in major and overall.

NUTR 489 Special Topics in...
Credits 1 to 4. 0 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of nutrition. May be repeated for credit.
Prerequisite: Junior or senior classification.

NUTR 491 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in nutrition. May be repeated 3 times for credit. Registration in multiple sections of this course are possible within a given semester provided that the per semester credit hour limit is not exceeded.

NUTR 601/ANSC 601 General Animal Nutrition
Credits 3. 3 Lecture Hours.
Comparative nutrition of animal species contrasting digestive, metabolic and physiological functions involved in processing and using nutrients.
Prerequisite: ANSC 303 or 318 or equivalent.
Cross Listing: ANSC 601/NUTR 601.

NUTR 602/ANSC 602 Energetics of Metabolism and Growth
Credits 3. 3 Lecture Hours.
Current fundamental concepts in protein and energy metabolism relating to nutrients required for maintenance, growth and development of animals.
Prerequisite: BICH 410 or approval of instructor.
Cross Listing: ANSC 602/NUTR 602.

NUTR 610/FSTC 610 Nutritional Pharmacometrics of Food Compounds
Credits 3. 3 Lecture Hours.
Introduction into nutritional pharmacokinetics and pharmacodynamics of food compounds; specific examples of toxicological and pharmacological effects of food compounds.
Prerequisite: NUTR 202 or NUTR 203 or FSTC 201 or CHEM 227 or CHEM 222 or approval of instructor.
Cross Listing: FSTC 610/NUTR 610.

NUTR 613/ANSC 613 Protein Metabolism
Credits 3. 3 Lecture Hours.
Basic concepts and recent advances in protein metabolism in animals with emphasis on physiological and nutritional significances; discussion of protein digestion; absorption of peptides; absorption, synthesis and degradation of amino acids; hormonal and nutritional regulation of protein turnover; determination of protein quality and requirements.
Prerequisite: BICH 411 or BICH 601 or equivalent or approval of instructor.
Cross Listing: ANSC 613/NUTR 613.

NUTR 614 Fermentation and Gastrointestinal Microbiology
Credits 3. 3 Lecture Hours.
Fermentation and gastrointestinal ecosystems in terms of microorganisms present, their activities and requirements and their interactions in a dynamic system.
Prerequisite: Beginning microbiology and/or biochemistry or approval of instructor.
Cross Listing: POSC 614 and VTMI 614.
NUTR 617/ANSC 617 Experimental Techniques in Meat Science
Credits 3. 1 Lecture Hour. 6 Lab Hours.
Methods used in separating and identifying muscle proteins and fats; techniques for determining postmortem changes of muscle tissue as a result of antemortem treatments.
Prerequisite: ANSC 607/FSTC 607; BICH 411.
Cross Listing: ANSC 617/NUTR 617.

NUTR 618/ANSC 618 Lipids and Lipid Metabolism
Credits 3. 3 Lecture Hours.
Chemical nature of various classes of lipids and lipid-derived hormones; absorption and metabolism of fatty-acids and lipids; regulation of lipid biosynthesis and obesity; relationship between lipid metabolism and cholesterol homeostasis; lipids as hormones.
Prerequisite: BICH 410 or approval of instructor.

NUTR 630 Nutrition in Disease
Credits 3. 3 Lecture Hours.
Human nutritional requirements in health and disease, emphasizing effects of disease states on intake, digestion, absorption, metabolism and excretion of nutrients; relationship of diet to development of certain diseases.
Prerequisites: NUTR 202; BICH 410 or equivalent.

NUTR 640/FSTC 640 Therapeutic Microbiology I
Credits 3. 3 Lecture Hours.
Alimentary (gastrointestinal) microbiology including: (i) the "normal" intestinal microbiota; (ii) probiotic and prebiotic nutritional supplements; (iii) recombinant pharambioics; (iv) gut-associated lymphoid tissue and mucosal immunity; (v) foodborne gastrointestinal pathogens; and (vi) fermented products as functional foods.
Prerequisite: Undergraduate survey course in microbiology (or instructor's consent).
Cross Listing: FSTC 640/NUTR 640.

NUTR 641 Nutritional Biochemistry I
Credits 3. 3 Lecture Hours.
Integration of the intermediary metabolism of glucose, amino acids and lipids with nutrition, physiology and pathophysiology in animals; regulation of metabolic pathways in cells, tissues and the whole body under normal and disease conditions; functions of vitamins and minerals in nutrient metabolism and health.
Prerequisite: BICH 411 or BICH 604. Offered during the fall semester.

NUTR 642 Nutritional Biochemistry II
Credits 3. 3 Lecture Hours.
Mechanisms through which specific nutrients modulate intracellular signal transduction and gene expression; molecular mechanisms by which nutrition modulates disease states such as atherosclerosis, cancer and arthritis.
Prerequisites: BICH 411; BICH 431/GENE 431 or equivalent.

NUTR 645/POSC 645 Nutrition and Metabolism of Vitamins
Credits 3. 3 Lecture Hours.
Chemistry and metabolism of the fat soluble and water soluble vitamins and their roles in animals; integrates cellular biochemistry and metabolism of the vitamins in vertebrate animal.
Prerequisites: POSC 411 or ANSC 303/NUTR 303; BICH 410 or BICH 603.
Cross Listing: POSC 645/NUTR 645.

NUTR 646 Fundamentals of Space Life Sciences
Credits 3. 3 Lecture Hours.
Integrates nutrition, physiology, and radiation biology to define major biological problems in long duration space flight; provide an overview of the problems of bone loss, muscle wasting, and radiation-enhanced carcinogenesis along with potential countermeasures; focus on nutritional interventions and exercise protocols.
Cross Listing: NUEN 646 and KINE 646.

NUTR 647/WFSC 647 Nutritional Biochemistry of Fishes
Credits 3. 3 Lecture Hours.
Principles of nutritional biochemistry including nutrient metabolism and biochemical energetics with special emphasis on finfish and shell fish.
Prerequisite: BICH 410 or equivalent.
Cross Listing: WFSC 647/NUTR 647.

NUTR 650/POSC 650 Nutrition and Metabolism of Minerals
Credits 3. 3 Lecture Hours.
Nutritional significance of minerals in animal metabolism; chemical, biochemical and physiological role of minerals and homeostatic control in animal metabolism.
Prerequisites: POSC 411 or ANSC 303/NUTR 303; BICH 410 or BICH 603.
Cross Listing: POSC 650/NUTR 650.

NUTR 669/FSTC 669 Experimental Nutrition & Food Science Laboratory
Credits 4. 1 Lecture Hour. 6 Lab Hours.
Experimental Nutrition & Food Science Laboratory. Nutritional intervention in animal models of metabolic or emotional disorders; genetic modifications or pathogens in foods products; analyses of gene expression and behavior.
Prerequisite: BICH 432/GENE 432/GENE 432/BICH 432 recommended; graduate classification in nutrition or related major.
Cross Listing: FSTC 669/NUTR 669.

NUTR 671/FSTC 671 Critical Evaluation of Nutrition and Food Science Literature: Evidence Based Reviews
Credits 3. 3 Lecture Hours.
Evaluation of scientific literature, research methods within the literature, and the quality of scientific studies to produce an evidence-based review in areas specific to nutrition and food science.
Prerequisites: NUTR 202 or NUTR 203 and STAT 302; knowledge of nutrition, statistics, and technical writing helpful.
Cross Listing: FSTC 671/NUTR 671.

NUTR 681 Seminar
Credit 1. 1 Lecture Hour.
Current developments in the field of nutrition; review of current literature and oral presentation of scientific papers on selected nutrition topics.
Prerequisite: Graduate classification.

NUTR 684 Professional Internship
Credits 1 to 16. 1 to 16 Other Hours.
Experience in application of formal training to applied nutrition under supervision of nutritionists, dietitians and faculty member. Student will investigate matter of mutual interest and report results in a professional paper approved by the graduate committee.
Prerequisite: Graduate classification.

NUTR 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Nutrition problems and procedures; problems assigned according to experience, interest and need of individual student.
Prerequisite: Approval of instructor prior to registration.
NVSC 689 Special Topics in...
Credits 1 to 4. 0 to 4 Lecture Hours. 0 to 4 Lab Hours.
Special topics in an identified area of nutrition. May be repeated for credit.
Prerequisites: Graduate classification and approval of instructor.

NVSC 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Investigations leading to thesis or dissertation in various areas of nutrition.
Prerequisite: Graduate classification.

NVSC - Naval Science

Courses

NVSC 101 Introduction to Naval Science
Credits 2. 2 Lecture Hours. 2 Lab Hours.
Seapower and the naval service; mission, organization, regulations, and broad warfare components of the Navy; overview of officer and enlisted rank and rating structures, procurement and recruitment, training and education, promotion and advancement, and retirement policies. Basic tenets of naval courtesy and customs, discipline, naval leadership, and ship's nomenclature. Major challenges facing Naval officers; areas of equal opportunity, fraternization and drug/alcohol abuse.

NVSC 205 Naval Sea Power and Maritime Affairs
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Naval history survey emphasizing major developments in strategy, tactics, technology, and effects of political climate; significant naval engagements and officers; includes an introduction to the role of seapower in national policy and diplomacy. Mahan’s naval strategy and the affects of maritime policy on global stability.

NVSC 210 Leadership and Management I
Credits 3. 3 Lecture Hours. 1 Lab Hour.
Principles of leadership and management and their application to duties and responsibilities for Junior Naval Officers; management theory, professional responsibility and human resource management programs; skills in leadership and management, communication, counseling, evaluations; administration of discipline developed through participation in case studies, experiential exercises and situational problems.

NVSC 301 Navigation
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Theory, principles and procedures of ship navigation in coastal and open ocean environments; piloting, ocean and tidal currents, weather, introduction to USN electronic and satellite navigational systems, guided participation in case studies involving maritime accidents.

NVSC 303 Evolution of Warfare
Credits 3. 3 Lecture Hours.
Art and concepts of land warfare; its evolution from the beginning of recorded history to present day; influence that leadership, political, economic, sociological and technological development have had on warfare throughout history.

NVSC 320 Naval Ships Systems I: Engineering
Credits 3. 3 Lecture Hours. 1 Lab Hour.
Study of engineering concepts and their application in U.S. Naval vessels: basic ship design, hydrodynamic forces, fluid dynamics, stability, propulsion, closed thermodynamic systems, electrical systems, shipboard power generation and distribution, shipboard safety, organization and firefighting.
Prerequisites: Junior or senior classification.

NVSC 401 Naval Ships Systems II: Weapons
Credits 3. 3 Lecture Hours. 1 Lab Hour.
Types and purpose of major weapons systems and platforms of the U.S. Naval forces; theory and operational principles of radar, sonar and communication circuits; fire control problem geometry, principles of ballistics, propulsion, launching and guidance of weapons; principles of electronic warfare and nuclear weapons.

NVSC 402 Leadership and Ethics
Credits 3. 3 Lecture Hours. 1 Lab Hour.
Theoretical concepts of Western moral traditions and ethical philosophy; topics include leadership, values, military ethics, Just War Theory, Uniform Code of Military Justice and Naval regulations; examination of ethical foundation for the development of leadership and communication skills; should be taken the semester of graduation.

NVSC 404 Naval Operations and Seamanship
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Relative motion, formation tactics, ship maneuvering behavior and characteristics, applied aspects of ship handling, afloat communications and ship employment; naval warfare, operations concepts, command and control, and joint warfare; review and analysis of case studies involving moral, ethical and leadership issues.
Prerequisite: NVSC 301; junior or senior classification.

NVSC 410 Amphibious Warfare
Credits 3. 3 Lecture Hours.
Historical survey of the projection of seapower ashore; background of military history with emphasis on Marine Corps contributions; selected amphibious operations and the evolution of current amphibious doctrine. Development of concepts, principles and techniques of amphibious operations.
Prerequisite: NVSC 303.

NVSC 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed study in problems in the field of naval science not covered by other courses in department.
Prerequisite: Approval of department head.

OCEN - Ocean Engineering

Courses

OCEN 201 Introduction to Ocean Engineering
Credits 3. 3 Lecture Hours.
Survey of ocean engineering; concepts and theories of wave-structure interaction; sources of technical information; coastal and ocean structures, moorings, laboratory models; underwater systems; naval architecture; ocean instrumentation; materials and corrosion; hydrographic surveying and positioning, recent developments in ocean engineering.
Prerequisite: CVEN 221 or registration therein.

OCEN 300 Ocean Engineering Wave Mechanics
Credits 3. 3 Lecture Hours.
Physical and mathematical fundamentals of ocean wave behavior; mechanics of wave motion; use of statistics and probability to develop design wave criteria.
Prerequisite: CVEN 311, OCEN 201 or registration therein.
OCEN 336 Fluid Dynamics Laboratory
Credit 1. 2 Lab Hours.
Introduction to laboratory techniques, calibration principles, reports and fluid measurements; determination of fluid properties; visualization of types of flow; experiments in closed conduit flow of air, water and oil; fluid drag and turbomachinery tests; open channel and gravity wave demonstrations.
Prerequisite: CVEN 311 or registration therein.

OCEN 362 Hydromechanics
Credits 3. 3 Lecture Hours.
Kinematics of fluids; differential analysis of fluid flow; incompressible, irrotational and turbulent flow; Navier-Stokes equations; flow of viscous fluids; open-channel flow.
Prerequisites: CVEN 311; MATH 308; junior or senior classification.

OCEN 400 Basic Coastal Engineering
Credits 3. 3 Lecture Hours.
Mechanics of wave motion; wave refraction, diffraction and reflection; wave forecasting; shore processes; planning of coastal engineering projects; design of seawalls, breakwaters, beach nourishment, and fixed and floating installations; dredging; risk analysis.
Prerequisites: OCEN 300 or approval of instructor; CVEN 311; junior or senior classification.

OCEN 401 Underwater Acoustics for Ocean Engineers
Credits 3. 3 Lecture Hours.
Fundamentals of underwater acoustics, SONAR equations, propagation of underwater sound, acoustic transducers and arrays, noise in the ocean environment, design and prediction of SONAR systems, ocean engineering applications of underwater sound.
Prerequisite: CVEN 311.

OCEN 402 Principles of Naval Architecture
Credits 3. 3 Lecture Hours.
Elementary principles of naval architecture; ship geometry and hydrostatics; load line and classification regulations; concept of intact and damaged stability; resistance and propulsion of water-borne vehicles; applications to the design consideration of semi-submersibles, catamarans and drilling rigs.
Prerequisite: CVEN 311.

OCEN 403 Dynamics of Offshore Structures
Credits 3. 3 Lecture Hours.
Prediction of loads due to wind, current and waves; introduction to concepts of linear structural dynamics and to the design of ocean structures; mooring and towing analysis; fluid-structure interactions; vibration of submerged structures; offshore pipelines; introduction to risk analysis.
Prerequisites: OCEN 300 or approval of instructor; CVEN 345, CVEN 363 or registration therein.

OCEN 407 Design of Ocean Engineering Facilities
Credits 4. 1 Lecture Hour. 6 Lab Hours.
Design of structures, equipment and systems for the ocean; environmental, logistical and reliability requirements; complete design process followed through group design project; delineation of alternatives, constraints, economics and environmental consequences included to strengthen real-life problem solving skills.
Prerequisites: OCEN 400, OCEN 402, OCEN 403 or approval of instructor.

OCEN 408 Underwater and Moored System Design
Credits 3. 3 Lecture Hours.
Basic principles of thermodynamics, fluid dynamics and human respiration physiology applied to design of underwater habitats, submersibles and diving bells; breathing gas supply for diving systems; heat transfer for underwater systems; pressure vessel design; remotely operated vehicles; subsea flowlines and manifold systems; and design of towed and moored systems.
Prerequisites: CVEN 311; MEEN 315 or approval of instructor.

OCEN 410 Ocean Engineering Laboratory
Credit 1. 3 Lab Hours.
Fundamental techniques and instrumentation for field and laboratory measurements pertaining to ocean engineering experiment planning; data analysis and data presentation; written reports describing planning, analysis and results of experiments.
Prerequisites: OCEN 400, OCEN 402, OCEN 403; junior or senior classification.

OCEN 475 Environmental Fluid Mechanics
Credits 3. 3 Lecture Hours.
Examines fluid and mass transport in naturally occurring flows; topics include molecular and turbulent diffusion; dispersion; river, estuary, and ocean mixing; dissolution boundary layers; tidal mixing; offshore wastewater outfalls; introduction to environmental quality numerical modeling.
Prerequisite: CVEN 311.

OCEN 481 Seminar
Credit 1. 1 Lecture Hour.
Responsible for new ocean engineers; professional ethics, membership in professional societies and professional registrations; case studies and lectures presented by staff and practicing engineers. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisite: OCEN 300.

OCEN 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Special problems in various areas of ocean engineering assigned to individual students or to groups; readings and assignments given and frequent consultations held.
Prerequisite: Approval of program head.

OCEN 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified field of ocean engineering. May be repeated for credit.
Prerequisite: Approval of instructor.

OCEN 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in ocean engineering. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor.

OCEN 630 Dynamics of Ocean Vehicles
Credits 3. 3 Lecture Hours.
Dynamics and stability of motion of immersed and floating structures and ocean vehicles; maneuverability and control; behavior of ocean vehicles and stationary platforms in waves. Design considerations leading to motion reduction; applications to surface vessels, submersibles and drilling rigs.
Prerequisites: CVEN 311, MEEN 459 or equivalent, or approval of instructor.
**OCEN 671 Ocean Wave Mechanics**  
**Credits 3.3 Lecture Hours.**  
Wave theory and applications to engineering problems; linear and non-linear theories of regular gravity waves; wave properties and transformation in shoaling water; spectral analysis of irregular waves; forecasting, hindcasting and theoretical spectra.  
**Prerequisite:** Prerequisite: CVEN 311 or equivalent.

**OCEN 672 Coastal Engineering**  
**Credits 3.3 Lecture Hours.**  
Effects of waves on coastal structures; design of seawalls breakwaters, jetties, harbors, ship channels and pipelines; intentional and accidental discharge of pollutants; diffusion and spreading; oil spill containment and collection.  
**Prerequisite:** OCEN 671.

**OCEN 673 Nonlinear Hydrodynamic Problems in Ocean Engineering**  
**Credits 3.3 Lecture Hours.**  
Nonlinear hydrodynamic problems involved with the complex offshore structures in high sea environment; nonlinear waves application of Volterra model to weakly nonlinear systems; generation of nonlinear model waves; nonlinear hydrodynamic interaction between waves and structure; dynamic analysis of nonlinear response of integrated offshore structures.  
**Prerequisites:** OCEN 671 and OCEN 678.

**OCEN 674 Ports and Harbors**  
**Credits 3.3 Lecture Hours.**  
Basic port planning including site selection, environmental factors and economic conditions; design of wharves, quays, jetties, breakwaters, terminals, navigational channels and fenders; harbor sedimentation and maintenance dredging; design of fishing, small craft and recreation boat harbors.  
**Prerequisite:** Approval of instructor.

**OCEN 675 Nonlinear Wave Dynamics**  
**Credits 3.3 Lecture Hours.**  
Nonlinear wave-wave interactions in steep ocean waves significantly affect wave properties and long-term wave evolution. Strong and weak wave interactions and their respective effects on waves are studied, using various perturbation methods. Applications are shown through using Hybrid Wave Models to analyze wave measurements and predict wave loads on structures.  
**Prerequisite:** OCEN 671.

**OCEN 676 Dynamics of Offshore Structures**  
**Credits 3.3 Lecture Hours.**  
Review of concepts of linear structural dynamic analysis for time and frequency domain simulations, functional design of off-shore platforms, pipelines, floating structures and moorings; environmental loading problems; hydrodynamic phenomena including wind and current interaction, vortex shedding and wave forces; structure-fluid interaction models.  
**Prerequisites:** OCEN 671 or approval of the instructor.

**OCEN 677 Environmental Fluid Mechanics**  
**Credits 3.3 Lecture Hours.**  
Introduction to fluid and mass transport in naturally occurring flows; topics include molecular and turbulent diffusion; dispersion; river, estuary, and ocean mixing; dissolution boundary layers; tidal mixing; offshore wastewater outfalls; introduction to environmental quality numerical modeling.  
**Prerequisite:** CVEN 311 or equivalent.

**OCEN 678 Fluid Dynamics for Ocean and Environmental Engineering**  
**Credits 3.3 Lecture Hours.**  
General conservation laws; Navier-Stokes equations; steady and unsteady Bernoulli's equation; potential flow theory and basics of panel methods; laminar and turbulent boundary layer; dispersion and diffusion processes in laminar and turbulent flow; flow past a body of any shape.  
**Prerequisite:** Prerequisite: CVEN 311 or equivalent.

**OCEN 681 Seminar**  
**Credit 1.2 Lab Hours.**  
Reports and discussion of current research and selected published technical articles.

**OCEN 682 Coastal Sediment Processes**  
**Credits 3.3 Lecture Hours.**  
Sediment properties and size distribution, fluvial sediment transport equations, movement of material by the sea, review of pertinent wave theories, littoral drift, inlet stability, coastal protection structures, similarity in sediment transport, movable bed models, sediment tracing, Aeolian sand transport, case studies.  
**Prerequisite:** OCEN 671 or approval of instructor.

**OCEN 683 Estuary Hydrodynamics**  
**Credits 3.3 Lecture Hours.**  
Development of applicable equations for tidal dynamics applied to real estuaries; technology for determination of mean velocities, circulation patterns, water depths, turbulent dispersion patterns, etc. for solution of environmental problems in estuaries; physical and mathematical models.  
**Prerequisites:** OCEN 678 or approval of instructor.

**OCEN 685 Directed Studies**  
**Credits 1 to 12.1 to 12 Other Hours.**  
Special topics not within scope of thesis research and not covered by other formal courses.

**OCEN 688 Marine Dredging**  
**Credits 3.3 Lecture Hours.**  
Dredge pump selection; pump and system characteristics; cavitation; types of dredges; continental shelf and deep-ocean dredging; head loss in horizontal and vertical pipes for two and three-phase flow; design of disposal methods for dredged material; environmental effects of dredging.  
**Prerequisite:** Approval of instructor.

**OCEN 689 Special Topics in...**  
**Credits 1 to 4.1 to 4 Lecture Hours.**  
Selected topics in an identified area of ocean engineering. May be repeated for credit.

**OCEN 691 Research**  
**Credits 1 to 23.1 to 23 Other Hours.**  
Research for thesis or dissertation.

**OCNG - Oceanography**

**Courses**

**OCNG 251 Oceanography**  
**Credits 3.3 Lecture Hours.**  
Overview of the ocean environment; interrelation of the subdisciplines of ocean sciences; importance of the oceans to human beings; human impact on the oceans.  
**Prerequisite:** Concurrent registration in ONCG 252 if necessary for meeting the 8 credit hour science core curriculum requirement.
OCNG 252 Oceanography Laboratory  
Credit 1. 2 Lab Hours.  
Hands-on laboratory experiments and exercises demonstrating principles of ocean sciences; emphasis on the unique interdisciplinary nature of the ocean and current ocean issues relevant to today’s society; tailored for the non-scientist. Honors sections are also available.

OCNG 291 Research  
Credits 0 to 4. 0 to 4 Other Hours.  
Research conducted under the direction of faculty member in oceanography. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.  
Prerequisites: Freshman or sophomore classification and approval of instructor.

OCNG 350 Marine Pollution  
Credits 3. 3 Lecture Hours.  
Sources and fates of marine pollutants; types of pollutants including plastics, oil and sound; impact of pollution on society.  
Prerequisite: Junior or senior classification or approval of instructor.

OCNG 401 Interdisciplinary Oceanography  
Credits 3. 3 Lecture Hours.  
Quantitative survey of interdisciplinary relationships between biological, chemical, geological/geophysical and physical aspects of the ocean. Honors section also available.  
Prerequisites: CHEM 101 or CHEM 107; MATH 131, MATH 151, or MATH 171.

OCNG 404 Ocean Observing Systems  
Credits 3. 3 Lecture Hours.  
Investigate the rationale behind ocean observing systems; familiarize with the relevant social, scientific design, technology and policy issues associated with observing systems.  
Prerequisite: OCNG 251 or OCNG 401 or approval of instructor.

OCNG 410 Introduction to Physical Oceanography  
Credits 3. 3 Lecture Hours.  
Elements of the physics of the sea; descriptive aspects as well as cause and effect relations in respect to currents, thermal structure and waves. Intended for majors in the physical sciences or engineering.  
Prerequisites: MATH 308; junior or senior classification.

OCNG 420 Introduction to Biological Oceanography  
Credits 3. 3 Lecture Hours.  
Biological aspects of the marine environment; marine organisms; productivity of the sea; marine pollution and fouling; use of the sea.  
Prerequisites: BIOL 112 or OCNG 251; junior or senior classification.

OCNG 425 Microbial Oceanography  
Credits 3. 3 Lecture Hours.  
Diversity and ecology of microorganisms in the ocean; role in the Earth system both in the contemporary ocean and the geological past.  
Prerequisites: Junior or senior classification, OCNG 251, or OCNG 401, or approval of instructor.

OCNG 430 Introduction to Geological Oceanography  
Credits 3. 3 Lecture Hours.  
History of Oceanography; physiographic provinces of the oceans, their origins and sediments; geological sampling techniques and geophysical methods; coasts and beaches, paleoceanography; global tectonics.  
Prerequisites: OCNG 251 or OCNG 401 or GEOL 101 or GEOL 104 or GEOG 203; junior or senior classification.

OCNG 440 Introduction to Chemical Oceanography  
Credits 3. 3 Lecture Hours.  
Chemical aspects of the marine environment; biogeochemical cycles of organic and inorganic constituents; primary productivity, the carbon dioxide system, nutrient cycles, stable and radioactive isotopes in the sea.  
Prerequisites: CHEM 102 or CHEM 104; junior or senior classification; sophomore with approval of instructor.

OCNG 451 Mathematical Modeling of Ocean Climate  
Credits 4. 3 Lecture Hours. 2 Lab Hours.  
Problem-based course in theoretical and computer techniques applied to mathematical solutions of ocean climate, including ocean circulation, climate variability, El Niño.  
Prerequisite: MATH 308 or MATH 451.

OCNG 485 Directed Studies  
Credits 1 to 4. 1 to 4 Other Hours.  
Special reading assignments, problems and discussion on oceanographic topics of mutual interest to student and instructor.  
Prerequisites: OCNG 251 or OCNG 401 or approval of instructor. An honors section is also available.

OCNG 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified area of oceanography. May be taken two times for credit.  
Prerequisite: OCNG 251 or OCNG 401 or approval of instructor. An honors section is also available.

OCNG 491 Research  
Credits 0 to 9. 0 to 9 Other Hours.  
Research conducted under the direction of faculty member in oceanography. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.  
Prerequisites: Junior or senior classification and approval of instructor. An honors section is also available.

OCNG 600 Survey of Oceanography  
Credits 3. 3 Lecture Hours.  
General survey of the scientific framework of oceanographic study; applications of ocean research to social and economic problems; interrelations between the ocean disciplines and other fields of study.  
Prerequisite: Approval of instructor.

OCNG 603 Communicating Ocean Science  
Credits 3. 3 Lecture Hours.  
Instruction and practice with presenting scientific information on the ocean to a variety of audiences under different time constraints; critical components for any presentation; knowing your audience; designing effective visual aids and graphics; leading your audience through complex concepts; and communication with non-scientists.

OCNG 604 Ocean Observing Systems  
Credits 3. 3 Other Hours.  
Investigate the rationale behind ocean observing systems; familiarize with the relevant social, scientific design, technology, and policy issues associated with observing systems.  
Prerequisite: Approval of instructor.
OCNG 605 Oceanography Cruise
Credits 2.2 Other Hours.
Specialized experience in research methods and analysis in oceanography via preparation for and participation in a research cruise of at least two weeks duration under the supervision of a Texas A&M oceanography faculty member. May be taken up to two times for MS candidates and four times for PhD candidates.
Prerequisite: Approval of instructor.

OCNG 608 Physical Oceanography
Credits 3.3 Lecture Hours.
Observations, instruments; physical properties of seawater; property distributions; characteristics of water masses; heat budget; kinematics; gravity, pressure, hydrostatics, stability; horizontal flow; Coriolis force, geostrophy; friction, wind drift; general circulation; wave motions; tides.
Prerequisite: MATH 172 or equivalent; PHYS 219.

OCNG 609 Dynamical Oceanography
Credits 3.3 Lecture Hours.
Systematic treatment of the kinematics, dynamics and thermodynamics of the ocean; integral conservation relations; solenoidal versus conservative vector fields; potential vorticity; geostrophic adjustment; inertial and buoyancy modes; Bernoulli-Montgomery potential; energetics in a rotating system; available potential energy; natural temporal and spatial scales.
Prerequisites: OCNG 608 or ATMO 435; MATH 601.

OCNG 610 Mathematical Modeling of Marine Ecosystems
Credits 4.3 Lecture Hours. 2 Lab Hours.
Theory and technique of model development for marine ecosystems; mathematical representation of interactions among nutrients, phytoplankton, zooplankton, fish and the physical environment; scrutiny of biological concepts and mathematical structure of existing models; laboratory segment to focus on computational techniques applicable to classroom problems.
Prerequisites: OCNG 608 and OCNG 620, calculus or approval of instructor.

OCNG 611 Global Scale Oceanography
Credits 3.3 Lecture Hours.
A balanced description of the ocean's large-scale circulation and water mass structure based on the interpretation of modern observations, with emphasis on the ocean's role in global climate, and physical-chemical property fluxes in basin to global scale budgets.

OCNG 612 Elements of Ocean Wave Theory
Credits 3.3 Lecture Hours.
Theories of simple harmonic surface gravity, capillary and internal waves. Wave propagation, dispersion and energy; modifications due to rotation, variable depth and finite amplitude.
Prerequisites: OCNG 608 and MATH 601 or approval of instructor.

OCNG 615 Numerical Modeling of Ocean Circulation I
Credits 4.3 Lecture Hours. 2 Lab Hours.
Mathematical theory and numerical technique of model development for ocean circulation; concepts of numerical consistency and stability; Lax equivalence theorem; commonly used finite difference schemes in ocean modeling; finite element and spectral methods as alternative means of discretisation; positivity and CFT method; relaxation and direct methods for solving elliptic equations.
Prerequisite: OCNG 608.

OCNG 616 Numerical Modeling of Ocean Circulation II
Credits 4.3 Lecture Hours. 2 Lab Hours.
Quasigeostrophic ocean circulation models; Arakawa's energy and enstrophy conserving scheme; spectral barotropic vorticity model on sphere; shallow water primitive equation models; geostrophic adjustment on different numerical grids; boundary conditions in numerical models; introduction to ocean general circulation models; mixed models and sub-gridscale parameterization; oceanic data assimilation.
Prerequisite: OCNG 615.

OCNG 617 Theories of Ocean Circulation
Credits 3.3 Lecture Hours.
Theories of wind-driven circulation, Sverdrup solution, frictional and inertial boundary regimes; instabilities, meanders and mesoscale features; role of stratification, topography and time dependence; Thermohaline circulation.
Prerequisite: Graduate classification.

OCNG 620 Biological Oceanography
Credits 3.3 Lecture Hours.
Critical analysis of contribution of biological science to our understanding of sea; discernible interrelationships between organisms and physicochemical parameters.
Prerequisites: General prerequisites for oceanography.

OCNG 625 Current Topics in Biological Oceanography
Credit 1.1 Lecture Hour.
Areas of current research: plankton processes; microbial food web; benthic communities; fisheries; global change. May be taken up to three times.
Prerequisite: OCNG 620 or approval of instructor.

OCNG 627 Ecology of the Continental Shelf
Credits 3.3 Lecture Hours.
Environments, populations and communities of the continental shelf. Interactions of the shelf with the estuaries and the deep sea; man's impact on the shelf ecosystems.
Prerequisite: Approval of instructor.

OCNG 630 Geological Oceanography
Credits 3.3 Lecture Hours.
Survey of marine geology, structure and composition of ocean basins and continental margins, properties of marine sediments.
Prerequisites: General prerequisites for oceanography.

OCNG 632 Sea-Level Change
Credits 3.3 Lecture Hours.
Modern sea level: topography, measurement, meteorologic and oceanographic contributions, periodic and non-periodic changes; long-term changes: determination, Cenozoic history, Quaternary glacial-interglacial fluctuations; changes during the past century and decade; observations, natural and anthropogenic influences; estimates of future changes and societal implications.
Prerequisite: Graduate classification; approval of instructor.

OCNG 640 Chemical Oceanography
Credits 3.3 Lecture Hours.
Prerequisites: General prerequisites for oceanography.
OCNG 641 Inorganic Aquatic Geochemistry
Credits 3. 3 Lecture Hours.
Chemical composition and properties of waters in the near Earth surface environment and their interactions with sedimentary minerals; major topics: thermochemical properties of natural waters, equilibrium and kinetic controlling ion speciation; geochemical processes at mineral surfaces; kinetics of mineral-water interactions; applications to modeling early diagenesis.
Prerequisite: Approval of instructor.

OCNG 644 Isotope Geochemistry
Credits 3. 3 Lecture Hours.
Stable and radioactive isotope variations in natural materials; applications to geochronometric, geothermometric and paleoclimatologic studies of the marine environment.
Prerequisite: Approval of instructor.

OCNG 645 Marine Organic Geochemistry
Credits 3. 3 Lecture Hours.
Origins, fates and distribution of organic compounds in contemporary marine environments and in recent and ancient sediments. Specific analytical techniques.
Prerequisite: Approval of instructor.

OCNG 646 Dynamics of Colloids in the Environment
Credits 3. 3 Lecture Hours.
Equilibrium and dynamic aspects of the physics and chemistry of such colloidal particles and macromolecules and the implications for environmental systems, relevant for organic carbon flux and cycling, fate and transport of pollutants, bioavailability of pollutants, or mobility of pollutants in groundwater.
Prerequisites: Physical Chemistry, Thermodynamics, Aquatic and Organic Chemistry.

OCNG 649 Estuarine Biogeochemistry
Credits 3. 3 Lecture Hours.
Geomorphology; physical oceanography and sedimentation dynamics of estuaries; chemistry of nutrients; trace metals and organic matter; major controls in estuarine productivity and interactions among estuaries, marshes and coastal waters.
Prerequisites: OCNG 620 and OCNG 640.

OCNG 650 Aquatic Microbial Ecology
Credits 3. 3 Lecture Hours.
Microbes in natural environments, including both water and sediment habitats in marine, fresh and ground water systems; process studies of microbial foodwebs and biogeochemical cycling; current methods and research directions.
Prerequisites: OCNG 620 and WFSC 414 or approval of instructor.

OCNG 651 Meteorological Oceanography
Credits 3. 3 Lecture Hours.
Interaction between the ocean and atmosphere; major features of the two systems; heat budget, teleconnections between ocean and atmosphere, El Niño and related phenomena.
Prerequisite: OCNG 608.

OCNG 652 Sedimentary Biogeochemistry
Credits 3. 3 Lecture Hours.
An interdisciplinary approach to understanding complex processes that occur near the marine sediment-water interface in marine and estuarine environments. Composition of marine sediments, pore water chemistry, role of organisms in chemical transformations and pelagic-benthic coupling. Carbon, nitrogen and sulfur cycling in sediments. Modeling biogeochemical processes at the sediment-water interface and during early burial diagenesis.
Prerequisites: OCNG 620 and OCNG 640 or approval of instructor.

OCNG 654 Plankton Ecology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Elective course, overview of phytoplankton and zooplankton; taxonomy; physiology; ecology; sampling design; current methods of investigation.
Prerequisite: OCNG 620.

OCNG 657 Data Methods and Graphical Representation in Oceanography
Credits 3. 3 Lecture Hours.
Provide the basic tools and techniques to process, analyze, and visualize oceanographic data sets; multi-disciplinary approach; real-world applications to physical, biological, chemical and geological oceanographic data; basic instruction in the MATLAB programming language.
Prerequisite: Knowledge of vector calculus and basic statistics.

OCNG 658 Ocean Computational Analysis Lab
Credit 1. 4 Lab Hours.
Laboratory course designed to train in computational techniques using modern (Python) and classic (FORTRAN) programming languages and scientific software packages (Generic Mapping Tools and MATLAB); labs focus on real oceanographic applications.
Prerequisites: Encourage concurrent with OCNG 657.

OCNG 659 Ocean Observing Applications
Credits 3. 3 Lecture Hours.
Conceptualization, design, and construction of oceanographic observing systems; practical experience with the Texas Automated Buoy System including system design, instrumentation setup and calibration, telecommunication systems, and data management.
Prerequisites: Master or doctoral classification in OCNG or related field by approval of instructor.

OCNG 662 Coastal and Marine Sedimentary Processes
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Sedimentary processes (erosion, transport and deposition) from the coastline to the deep sea; development of estuaries, deltas, continental shelves, submarine canyons, fans; behavior of fluids and particles in boundary layers. Lab: recirculating flume, field and lab instrumentation.
Prerequisite: Approval of instructor.

OCNG 666 Principles of Geodynamics
Credits 4. 4 Lecture Hours.
Geological and geophysical methods and phenomena pertinent to geodynamics; plate tectonics; seismicity and seismology; magnetics; gravity; heat flow; igneous, metamorphic and sedimentary petrology; paleontology; and rock mechanics.
Prerequisite: Approval of instructor.

OCNG 668 Geology and Geophysics of Small Ocean Basins
Credits 3. 3 Lecture Hours.
Geology and geophysics of the Gulf of Mexico, Caribbean, Mediterranean, Arctic Ocean, Red Sea and Philippine Sea; the regional geology, sediment distribution, general structure and origin of each basin.
Prerequisite: OCNG 630.
OCNG 670 Deep Sea Sediments  
Credits 3.3 Lecture Hours. 0 Lab Hours.  
Formation process, core description, physical properties, lithostratigraphy, seismic stratigraphy and paleoceanographic significance of deep marine sediments.

OCNG 673 High-Resolution Marine Geophysics  
Credits 3.2 Lecture Hours. 2 Lab Hours.  
Introduction to the geophysical nature of the seafloor and marine subbottom to 1.5 seconds two-way travel time; generation, use and interpretation of reflection and side-scan sonar records and magnetic anomalies of various marine environments and seafloor features.  
Prerequisite: Approval of instructor.

OCNG 674 Paleoceanography  
Credits 3.3 Lecture Hours.  
History of oceans through geologic time; marine paleontological, geochemical, sedimentological and geophysical evidence; inferred changes in seawater properties, ocean circulation and sea level; relation to climate, tectonic processes, atmospheric chemistry and evolution of life.  
Prerequisite: OCNG 630 or approval of instructor.

OCNG 677/ATMO 677 Geophysical Data Assimilation  
Credits 4.3 Lecture Hours. 2 Lab Hours.  
Modern data assimilation methods applied to oceanic and atmospheric circulation models, as well as in other simple models; methods to interpolate one-, two- and three-dimensional randomly spaced data to regular grids for use in numerical models of atmospheric and oceanic circulation.  
Prerequisites: OCNG 657, ATMO 632, STAT 601.  
Cross Listing: ATMO 677/OCNG 677.

OCNG 678 Coastal Dynamics  
Credits 3.3 Lecture Hours.  
Surveys dynamical processes that determine estuarine and continental shelf circulation; geophysical scale flow where Earth’s rotation and buoyancy effects are important; analytical and numerical methods used to isolate and study these processes.  
Prerequisite: OCNG 609.

OCNG 679 Proxy Reconstruction of Late Cenozoic Climate: Calibrations and Applications  
Credits 3.3 Lecture Hours.  
Paleo-proxy calibration and application in reconstructing Late Cenozoic climate history; issues related to geochemical and sedimentological proxies used in the field of paleoclimatology/paleoceanography.  
Prerequisite: Graduate classification.

OCNG 681 Seminar  
Credit 1.1 Lecture Hour.  
Presented by faculty, students, staff and visiting scientists; based on recent scientific research.  
Cross Listing: MARB 681 and MARS 681.

OCNG 684 Professional Internship  
Credits 1 to 6.1 to 6 Other Hours.  
A directed internship in a professional setting to provide on-the-job training in ocean observing systems skills appropriate to the student’s professional objectives.  
Prerequisites: Approval of student's committee chair; OCNG 684, OCNG 657.

OCNG 685 Directed Studies  
Credits 1 to 6.1 to 6 Other Hours.  
Special topics to suit small group requirements. Problems not within thesis research and not covered by any other course in established curriculum.  
Prerequisites: General prerequisites for oceanography.

OCNG 689 Special Topics in...  
Credits 1 to 4.1 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified area of oceanography. May be repeated for credit.  
Prerequisite: Approval of instructor.

OCNG 691 Research  
Credits 1 to 23.1 to 23 Other Hours.  
For thesis or dissertation.

PERF - Performance Studies

Courses

PERF 101 Introduction to Performance Studies  
Credits 3.3 Lecture Hours.  
Survey of topics in the interdisciplinary field of performance studies, including forms of performance, performance in everyday life and performance in global and intercultural contexts; in-class performance exercises and discussions; major writing component.

PERF 202 Introduction to Performance Technology  
Credits 3.3 Lecture Hours. 1 Lab Hour.  
Basic hardware, software, and aesthetic concepts of technology-based artistic performance; basic electricity, electronics, troubleshooting, audio and video design software, study of significant works, and participation in a departmental production.

PERF 284 Performance Studies Internship  
Credits 0 to 4.0 to 4 Lecture Hours.  
Supervised experience program conducted in the area of the student's interest in performance studies. May be taken three times for credit.  
Prerequisite: PERF 101.

PERF 292 Cooperative Education in Performance Studies  
Credits 0 to 3.0 to 3 Other Hours.  
Educational work assignment by a student in the field of his or her career interest and course of study; supervision of the student by the cooperating employer and the instructor; technical report on a related subject area approved by the instructor. May be taken two times for credit.  
Prerequisite: PERF 101.

PERF 301 Performance in World Cultures  
Credits 3.3 Lecture Hours.  
Application of the tools of performance studies to explore the enactment of the arts in world cultures and the ways the people of every society express themselves in performance; examination of different genres of performance through music, theatre, verbal art and dress.  
Prerequisite: Junior or senior classification or approval of instructor.  
Cross Listing: MUSC 301 and THAR 301.

PERF 318/MUSC 318 Electronic Composition  
Credits 3.3 Lecture Hours.  
Project-based study of techniques for creating electronic and mixed-media performance; critical analysis of important electronic and interactive works; interactive media programming techniques for sound and video synthesis, sampling, digital signal processing.  
Prerequisites: Junior or senior classification and MUSC 316, PERF 202, or approval of instructor.  
Cross Listing: MUSC 318/PERF 318.
PERF 325/MUSC 325 Dance and World Cultures
Credits 3. 3 Lecture Hours.
Examination of international relationships between dance, culture, identity, gender, youth and politics; relationships between dancing, gender and politics in specific cultures and in globalization; variety of dance practices around the globe.
Prerequisite: Junior or senior classification.
Cross Listing: MUSC 325/PERF 325.

PERF 326 Dance and Identity in the United States
Credits 3. 3 Lecture Hours.
Analysis of dance events as complex sites for social action; examines dances performed by diverse groups of people; considers such issues as identity, community, diversity, gender and representation in the United States.
Prerequisite: Junior or senior classification.

PERF 327 Popular Musics in the African Diaspora
Credits 3. 3 Lecture Hours.
Examination of a range of popular musics from the twentieth century that have emerged in conjunction with the historical global spread of peoples and cultures from the African continent; technical knowledge about music is not required; focus on social and cultural contexts for popular music.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: AFST 327 and MUSC 327.

PERF 402 Intermedia Performance
Credits 3. 3 Lecture Hours.
Study of theory, history, literature and techniques of intermedia composition and design for film, theatre, dance, interactive media, and other forms of performance; examination of the collaborative creative process; projects in interdisciplinary performance.
Prerequisites: Junior or senior classification and MUSC 316, PERF 202, or approval of instructor.
Cross Listing: FILM 402 and MUSC 402.

PERF 481 Senior Project
Credits 3. 1 Lecture Hour. 5 Lab Hours.
Capstone senior project on an individually-chosen research topic, presentation of a performance or interdisciplinary project; major writing and oral communication components.
Prerequisites: Performance studies major; completion of all performance studies coursework or taken concurrently with this course; approval of instructor, advisor and department head.

PERF 483 Performance Practicum
Credits 1 to 3. 1 to 3 Other Hours.
Faculty-supervised performance experience in a public setting as part of a department production or an approved external production. May be taken four times for credit.
Prerequisite: Junior or senior classification and approval of instructor.

PERF 484 Performance Studies Internship
Credits 0 to 4. 0 to 4 Other Hours.
Supervised experience program conducted in the area of the student's interest in performance studies. May be taken three times for credit.
Prerequisites: PERF 101; junior or senior classification.

PERF 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in performance studies. May be repeated for credit.
Prerequisite: Approval of instructor.

PERF 491 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the direction of faculty member in performance studies. May be repeated 1 time for credit.
Prerequisites: Junior or senior classification and approval of instructor.

PERF 492 Cooperative Education in Performance Studies
Credits 0 to 3. 0 to 3 Other Hours.
Educational work assignment by a student in the field of his or her career interest and course of study; supervision of the student by the cooperating employer and the instructor; technical report on a related subject area approved by the instructor. May be taken two times for credit.
Prerequisites: PERF 101; junior or senior classification.

PERF 600 Graduate Scholarship in Performance Studies
Credits 3. 3 Lecture Hours.
Overview of history, key issues, and major arguments in performance studies.
Prerequisites: Admission to the MA in Performance Studies or approval of instructor.

PERF 601 Theories of Performance Studies
Credits 3. 3 Lecture Hours.
Overview of major theories of performance studies and related disciplines; also includes major critical and cultural theories that contribute to the field.
Prerequisites: Admission to the MA in Performance Studies or approval of instructor.

PERF 602 Research Methods in Performance Studies
Credits 3. 3 Lecture Hours.
Examination and assessment of primary research methods in performance studies; emphasis on post-positivist methods; includes examination of ethical imperatives in research.
Prerequisite: Admission to the MA in Performance Studies or approval of instructor.

PERF 603 Performance, Power, and Identity
Credits 3. 3 Lecture Hours.
Issues in, and production of, power and identity in expressive culture, examines how forms of power and varieties of social identity shape, and are shaped by, performance.
Prerequisites: PERF 600 or approval of instructor.

PERF 604 Performing Vernacular Culture
Credits 3. 3 Lecture Hours.
Examines populist and counter-traditions in expressive culture; emphasis on contemporary cultures of performance and/as practices of everyday life.
Prerequisites: PERF 600 or approval of instructor.

PERF 605 Topics in Globalization and Performance Studies
Credits 3. 3 Lecture Hours.
Examines expressive cultures in global contexts; theoretical and methodological approaches to globalization and/in performance. May be taken two times for credit.
Prerequisites: PERF 600 or approval of instructor.

PERF 610 Graduate Studies in Dance Research
Credits 3. 3 Lecture Hours.
Examines key theoretical and methodological issues in dance studies from a performance studies perspective.
Prerequisite: PERF 602 or approval of instructor.
PERF 611 Contemporary Religions and Performance
Credits 3.3 Lecture Hours.
Examines the intricate relationship between religious traditions and performance. Focus on contemporary religious movements.
Prerequisite: Graduate classification.

PERF 612 Music Capitalism
Credits 3.3 Lecture Hours.
Explores the production, distribution, and consumption of music genres as a performance of capitalism.
Prerequisite: Graduate classification.

PERF 613 Performing Texas
Credits 3.3 Lecture Hours.
Explores "Texas" as a set of complex performances that construct specific identities and communities.
Prerequisite: Graduate classification.

PERF 614 Soundscape
Credits 3.3 Lecture Hours.
Explores sound in social life; sound as performative of identity; sound performance.
Prerequisite: Graduate classification.

PERF 615 Spectacle, Performance, and Politics
Credits 3.3 Lecture Hours.
Interdisciplinary and international exploration of spectacle as political performance.
Prerequisite: Graduate classification.

PERF 616 Sport as Performance
Credits 3.3 Lecture Hours.
Explores sport as manifold modes of cultural performance; focus on embodiment, gender, race, nationalism, spectacle, politics, warfare, and media.
Prerequisite: Graduate classification.

PERF 620 Critical Ethnographic Methods in Performance Studies
Credits 3.3 Lecture Hours.
Critical methods in performance ethnography; emphasis on political dimensions of field encounter. May be taken two times for credit.
Prerequisites: PERF 600, PERF 602.

PERF 621 Topics in Popular Music Studies
Credits 3.3 Lecture Hours.
Examination of context, politics, and political economy of specific popular music forms. May be repeated for a total of 9 credits.
Prerequisites: PERF 600, PERF 601, PERF 602, or approval of instructor.

PERF 622 Performance and the Construction of American Identity
Credits 3.3 Lecture Hours.
Role of performance in construction of national identity; special emphasis on post-Civil War US.
Prerequisites: PERF 600, PEF 601, PERF 602, or approval of instructor.

PERF 623 Phenomenology and Music
Credits 3.3 Lecture Hours.
Theoretical and methodological potentials of phenomenology in analyses of music; special emphasis on use of phenomenology to examine multiple aspects of music production, including embodiment.
Prerequisites: PERF 600, PERF 601, PERF 602, or approval of instructor.

PERF 625 Latino/a Expressive Culture
Credits 3.3 Lecture Hours.
Explores how issues concerning Latinos, including race and ethnicity, religion, border politics, immigration, the drug war, family, gender and sexuality, and class, are reflected and debated through expressive forms of performance such as theater, comedy music, folklore and performance art.
Prerequisite: Acceptance into the MA in Performance Studies program or approval of instructor.

PERF 682 American Theatre: Gender on the U.S. Stage
Credits 3.3 Lecture Hours.
Focuses on 18th-21st century texts and performers in order to account for transformations in representations as well as lived experiences of gender.
Prerequisite: Enrollment in the MA in Performance Studies or approval of instructor.

PERF 685 Directed Studies
Credits 1 to 3.1 to 3 Other Hours.
Directed studies in specific areas of performance studies. Student may take up to two sections of directed studies in the same semester, with a maximum of 6 credits.
Prerequisites: PERF 600, PERF 601, PERF 602, or approval of instructor.

PERF 689 Special Topics in Performance Studies
Credits 3.3 Lecture Hours.
Selected topics in an identified area of performance studies. May be repeated for a total of 9 credits.
Prerequisites: PERF 600, PERF 601, PERF 602, or approval of instructor.

PERF 691 Research
Credits 1 to 3.1 to 3 Other Hours.
Research for thesis.
Prerequisites: Approval of department head.

PETE - Petroleum Engineering

Courses

PETE 201 Introduction to Petroleum Engineering
Credit 1.1 Lecture Hour.
Overview and history of the petroleum industry and petroleum engineering; nature of oil and gas reservoirs, exploration and drilling, formation evaluation, well completions and production, surface facilities, reservoir mechanics, improved oil recovery; impact of ethical, societal, environmental considerations; career development resources, including professional society.
Prerequisite: Approval of department head.

PETE 225 Introduction to Drilling Systems
Credits 3.2 Lecture Hours.3 Lab Hours.
Introduction to petroleum drilling systems, including fundamental petroleum engineering concepts, quantities and unit systems, drilling rig components, drilling fluids, pressure loss calculations, casing, well cementing, and directional drilling.
Prerequisites: Grade of C or better in ENGR 112, MATH 152 and PHYS 218.

PETE 285 Directed Studies
Credits 1 to 4.1 to 4 Other Hours.
Special problems in various areas of petroleum engineering assigned to individual students or to groups.
Prerequisites: Approval of department head.
PETE 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of petroleum engineering. May be repeated for credit. 
Prerequisite: Approval of instructor.

PETE 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of a faculty member in petroleum engineering. May be taken two times for credit. Registration in multiple sections of this course is possible within a given semester. 
Prerequisites: Freshman or sophomore classification and approval of instructor.

PETE 300 Summer Practice
Credits 0.
Required. No Credit. Industry practice to familiarize the petroleum engineering student with practices and equipment of the petroleum industry. Approval of advisor required.

PETE 301 Petroleum Engineering Numerical Methods
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Use of numerical methods in a variety of petroleum engineering problems; numerical differentiation and integration; root finding; numerical solution of differential equations; curve fitting and interpolation; computer applications; introduction to the principles of numerical simulation methods. 
Prerequisites: MATH 308, junior or senior classification, petroleum engineering majors only; or approval of instructor.

PETE 310 Reservoir Fluids
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Thermodynamic behavior of naturally occurring hydrocarbon mixtures; evaluation and correlation of physical properties of petroleum reservoir fluids including laboratory and empirical methods. 
Prerequisites: Grade of C or better in CHEM 107 and CHEM 117; MATH 251, MEEN 315, PETE 311. Corequisite: MATH 308.

PETE 311 Reservoir Petrophysics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Systematic theoretical and laboratory study of physical properties of petroleum reservoir rocks; lithology, porosity, elastic properties, strength, acoustic properties, electrical properties, relative and effective permeability, fluid saturations, capillary characteristics and rock-fluid interactions such as adsorption and absorption. 
Prerequisites: MATH 251; PHYS 208 with a grade of C or better. Corequisite: GEOL 104.

PETE 314 Transport Processes in Petroleum Production
Credits 3. 3 Lecture Hours.
Basics and applications of fluid mechanics (statics; mass, energy, momentum balances; laminar and turbulent flow, Reynolds number, Moody diagram; non-Newtonian fluid flow; multi-phase flow; flow in porous media, non-Darcy flow); heat transfer (heat conduction, convection, heat exchangers); emphasis on analogies and similarities within mass, energy and momentum transport. 
Prerequisites: MEEN 315, junior or senior classification, petroleum engineering majors only; or approval of instructor.

PETE 321 Formation Evaluation
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Well-log interpretation for formation evaluation of hydrocarbon-bearing reservoirs; basic rock physics principles; theory of tool operation; analysis of open hole logs and core measurements to estimate hydrocarbon reserves and petrophysical properties of the formation such as porosity, net pay thickness, water/hydrocarbon saturation, permeability and saturation-dependent capillary pressure; formation evaluation of clay-free and shaly-sand formations as well as basic introduction to formation evaluation of organic-shale formations.

PETE 322 Geostatistics
Credits 3. 3 Lecture Hours.
Introduction to geostatistics; basic concepts in probability and univariate statistics; bivariate statistics and spatial relationship; covariance and correlation; second order stationarity; variogram estimation and modeling; spatial estimation and reservoir modeling; simple and ordinary kriging; uncertainty analysis; estimation versus conditional simulation; sequential Gaussian simulation. 
Prerequisites: Senior classification, petroleum engineering majors only; or approval of instructor.

PETE 323 Fundamentals of Reservoir Engineering
Credits 3. 3 Lecture Hours.
Determination of reserves; material balance methods; aquifer models; fractional flow and frontal advance; displacement, pattern and vertical sweep efficiencies in waterfloods; enhanced oil recovery processes; design of optimal recovery processes; introduction and performance analysis of unconventional reservoirs. 
Prerequisites: PETE 301, PETE 310, PETE 311; GEOL 404, junior or senior classification, petroleum engineering majors only; or approval of instructor.

PETE 324 Well Testing
Credits 3. 3 Lecture Hours.
Analysis of well performance under varied reservoir conditions including evaluation of unsteady, pseudo-steady and steady state flow; well testing methods used to determine well and reservoir parameters; applications to conventional and unconventional wells producing gas and/or liquids; fundamentals of preparing and operating well test equipment to monitor, measure and gather samples for evaluating well performance. 
Prerequisites: PETE 301, PETE 310, PETE 311; GEOL 404, junior or senior classification, petroleum engineering majors only; or approval of instructor.

PETE 325 Petroleum Production Systems
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Petroleum operation and oil field equipment including onshore and offshore production systems; wellbore inflow and outflow and backpressure analysis; downhole completion and sand control equipment; artificial lift equipment and design; stimulation, workover/completion nomenclature; flow assurance; produced fluids, fluid separation and metering, safety systems, pressure boosting and monitoring. 
Prerequisites: PETE 301, PETE 310, PETE 314, junior or senior classification, petroleum engineering majors only; or approval of instructor.
PETE 335 Technical Presentations I  
Credit 1. 1 Lecture Hour.  
Preparation of a written technical paper proposal on a subject related to petroleum technology and an oral presentation of the proposal in a formal technical conference format; oral presentations are judged by petroleum industry professionals at the departmental student paper contest held during the same academic year.  
Prerequisites: COMM 203, COMM 205 or ENGL 210; junior or senior classification.

PETE 353 Petroleum Project Evaluation  
Credits 3. 3 Lecture Hours.  
Economic analysis and investment decision methods in petroleum and mineral extraction industries; depletion, petroleum taxation regulations, and projects of the type found in the industry; mineral project evaluation case studies.  
Corequisites: PETE 301, PETE 310.

PETE 355 Drilling Engineering  
Credits 3. 3 Lecture Hours.  
Design and evaluation of well drilling systems; identification and solution of drilling problems; wellbore hydraulics, well control, casing design; well cementing directional drilling, offshore drilling.  
Prerequisites: PETE 225 with a grade C or better, PETE 314; PETE 321, PETE 325.

PETE 401 Reservoir Simulation  
Credits 2. 1 Lecture Hour. 3 Lab Hours.  
Solution of production and reservoir engineering problems using state-of-the-art commercial reservoir simulation software, using data commonly available in industry; emphasis on reservoir description, reservoir model design and calibration, production forecasting and optimization, economic analysis and decision making under uncertainty.  
Prerequisites: PETE 310, PETE 321, PETE 323, PETE 324, PETE 353.

PETE 402 Integrated Asset Development  
Credits 3. 1 Lecture Hour. 6 Lab Hours.  
Capstone design encompassing previously acquired skills; project teams formed to solve practical petroleum engineering problems using current tools; technical content of the projects may include any combination of drilling and completion, formation evaluation, inflow/outflow design and analysis, and application of reservoir engineering principles.  
Prerequisites: PETE 355, PETE 401, PETE 404, PETE 410.

PETE 404 Integrated Reservoir Modeling  
Credits 3. 3 Lecture Hours.  
Geophysical, geological, petrophysical and engineering data with geostatistical methods to create reservoir descriptions for dynamic reservoir modeling (simulation); geostatistical concepts such as variogram modeling, kriging and sequential Gaussian simulation; combines several techniques to quantify uncertainty in a realistic dynamic reservoir simulation.  
Corequisite: PETE 401.

PETE 406 High Performance Drilling Design and Operational Practices  
Credits 3. 3 Lecture Hours.  
Preparation in achieving differentiating drilling performance in the most complex wells; includes training in the underlying physics of each type of performance limiter and real time and engineering practices to address the limitation; performance management workflows and change models required to effectively change the way organizations conduct work essential in achieving higher performance.  
Prerequisite: PETE 355.

PETE 410 Production Engineering  
Credits 3. 3 Lecture Hours.  
Fundamental production engineering design, evaluation and optimization for oil and gas producing wells; well deliverability; formation damage and skin analysis; well completion selection; technologies that improve oil and gas well performance including artificial lift and well stimulation.  
Prerequisites: PETE 321, PETE 323, PETE 324, PETE 325.

PETE 416 Solving Common Production Engineering Problems  
Credits 3. 3 Lecture Hours.  
Application of petroleum engineering tools, methods and techniques to solve real problems that petroleum engineers encounter in producing individual wells; focus primarily on problems associated with single-phase gas wells and uses Microsoft Excel to solve many of these problems.  
Prerequisite: PETE 410.

PETE 435 Technical Presentations II  
Credit 1. 1 Lecture Hour.  
Preparation of a written technical paper on a subject related to petroleum technology and an oral presentation of the paper in a formal technical conference format; oral presentations are judged by petroleum industry professionals at the departmental student paper contest held during the same academic year.  
Prerequisites: PETE 335; satisfactory performance in junior student paper contest.

PETE 458 Energy and Sustainability  
Credits 3. 3 Lecture Hours.  
Energy resources and use with emphasis on long-term sustainability; considers fossil, nuclear and alternative energy sources, electricity and transportation, energy conversions, energy efficiency, energy security, energy policy and environmental impact.

PETE 485 Directed Studies  
Credits 1 to 5. 1 to 5 Other Hours.  
Special problems in various phases of petroleum engineering assigned to individual students or to groups.  
Prerequisites: Junior or senior classification and approval of department head.

PETE 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified field of petroleum engineering. Approval of instructor. May be repeated for credit.

PETE 491 Research  
Credits 1 to 4. 1 to 4 Other Hours.  
Research conducted under the direction of a faculty member in petroleum engineering. May be taken two times for credit. Registration in multiple sections of this course is possible within a given semester.  
Prerequisites: Junior or senior classification and approval of instructor.

PETE 602 Well Stimulation  
Credits 3. 3 Lecture Hours.  
Design and analysis of well stimulation methods, including acidizing and hydraulic fracturing; causes and solutions to low well productivity.

PETE 603 Advanced Reservoir Engineering I  
Credits 3. 3 Lecture Hours.  
Petroleum reservoir simulation basics including solution techniques for explicit problems.

PETE 604 Advanced Reservoir Engineering II  
Credits 3. 3 Lecture Hours.  
Advanced petroleum reservoir simulation with generalized methods of solution for implicit problems.  
Prerequisite: PETE 603.
PETE 605 Phase Behavior of Petroleum Reservoir Fluids
Credits 3. 3 Lecture Hours.
Pressure, volume, temperature, composition relationships of petroleum reservoir fluids.

PETE 606 EOR Methods--Thermal
Credits 3. 3 Lecture Hours.
Fundamentals of enhanced oil recovery (EOR) methods and applications of thermal recovery methods.
Prerequisite: PETE 323.

PETE 608 Well Logging Methods
Credits 3. 3 Lecture Hours.
Well logging methods for determining nature and fluid content of formations penetrated by drilling. Development of computer models for log analysis.

PETE 609 Enhanced Oil Recovery Processes
Credits 3. 3 Lecture Hours.
Fundamentals and theory of enhanced oil recovery; polymer flooding, surfactant flooding, miscible gas flooding and steam flooding; application of fractional flow theory; strategies and displacement performance calculations.
Prerequisite: PETE 323.

PETE 611 Application of Petroleum Reservoir Simulation
Credits 3. 3 Lecture Hours.
Use of simulators to solve reservoir engineering problems too complex for classical analytical techniques.
Prerequisites: PETE 400 and PETE 401.

PETE 612 Unconventional Oil and Gas Reservoirs
Credits 3. 3 Lecture Hours.
As conventional oil and gas resources are depleted, unconventional resources, including heavy oil and gas from low-permeability sandstones, fractured shales, coal bed, and hydrates, will assume greater roles in meeting USA and world energy demands; this course emphasizes resources, geologic and geographic occurrences, recovery technology and economics of unconventional hydrocarbon resources.
Prerequisite: Graduate classification in petroleum engineering, geology or geophysics.

PETE 613 Natural Gas Engineering
Credits 3. 3 Lecture Hours.
Flow of natural gas in reservoirs and in wellbores and gathering systems; deliverability testing; production forecasting and decline curves; flow measurement and compressor sizing.
Prerequisites: PETE 323 and PETE 324.

PETE 616 Engineering Near-Critical Reservoirs
Credits 3. 3 Lecture Hours.
Identification of reservoir fluid type; calculation of original gas in place, original oil in place, reserves and future performance of retrograde gas and volatile oil reservoirs.
Prerequisites: PETE 323, PETE 400, PETE 401.

PETE 617 Petroleum Reservoir Management
Credits 3. 3 Lecture Hours.
The principles of reservoir management and application to specific reservoirs based on case studies presented in the petroleum literature.

PETE 618 Modern Petroleum Production
Credits 3. 3 Lecture Hours.
An advanced treatment of modern petroleum production engineering encompassing well deliverability from vertical, horizontal and multilateral/multibranch wells; diagnosis of well performance includes elements of well testing and production logging; in this course the function of the production engineer is envisioned in the context of well design, stimulation and artificial lift.

PETE 619 Naturally Fractured Reservoirs
Credits 3. 3 Lecture Hours.
Explore all relevant subject matter in naturally fractured reservoirs; naturally fractured reservoirs are commonplace throughout the world, however there is a general lack of understanding of such reservoirs; provides the background for all relevant topics such as characterization, fluid flow, simulation and enhanced oil recovery.
Prerequisite: Approval of instructor.

PETE 620 Fluid Flow in Petroleum Reservoirs
Credits 3. 3 Lecture Hours.
Analysis of fluid flow in bounded and unbounded reservoirs, wellbore storage, phase redistribution, finite and infinite conductivity fractures; dual-porosity systems.
Prerequisite: PETE 323.

PETE 621 Petroleum Development Strategy
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Applications of the variables, models and decision criteria used in modern petroleum development; case approach used to study major projects such as offshore development and assisted recovery. Both commercial and student-prepared computer software used during the lab sessions to practice methods.

PETE 622 Exploration and Production Evaluation
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Selected topics in oil industry economic evaluation including offshore bidding, project ranking and selection, capital budgeting, long-term oil and gas field development projects and incremental analysis for assisted recovery and acceleration.

PETE 623 Waterflooding
Credits 3. 3 Lecture Hours.
Design, surveillance and project management of waterfloods in reservoirs.
Prerequisite: PETE 323.

PETE 624 Rock Mechanic Aspects of Petroleum Reservoir Response
Credits 3. 3 Lecture Hours.
Reservoir rocks and their physical behavior; porous media and fracture flow models; influence of rock deformability, stress, fluid pressure and temperature.
Prerequisite: PETE 604.

PETE 625 Well Control
Credits 3. 3 Lecture Hours.
Theory of pressure control in drilling operations and during well kicks; abnormal pressure detection and fracture gradient determination; casing setting depth selection and advanced casing design; theory supplemented on well control simulators.
Prerequisites: PETE 411.

PETE 626 Offshore Drilling
Credits 3. 3 Lecture Hours.
Offshore drilling from fixed and floating drilling structures; directional drilling including horizontal drilling; theory of deviation monitoring and control.
Prerequisite: PETE 411.
PETE 627 Well Completion and Workover
Credits 3.3 Lecture Hours.
Development of design options, systems and procedures to meet deliverability, safety and integrity requirements for completions and workover equipment; overview of methods in the oil and gas industry; function and design criteria of well components.
Prerequisite: Graduate classification.

PETE 628 Horizontal Drilling
Credits 3.3 Lecture Hours.
Changing a wellbore from vertical to horizontal; long- and short-radius horizontal wells; bottomhole assemblies for achieving and maintaining control of inclination and direction; drilling fluids; torque and drag calculations; transport of drilled solids.
Prerequisite: PETE 411.

PETE 629 Advanced Hydraulic Fracturing
Credits 3.3 Lecture Hours.
Physical principles and engineering methods involved in hydraulic fracturing; an advanced treatise integrating the necessary fundamentals from elasticity theory, fracture mechanics and fluid mechanics to understand designs, optimization and evaluate hydraulic fracturing treatments including special topics such as high permeability fracturing and deviated well fracturing.

PETE 630 Geostatistics
Credits 3.3 Lecture Hours.
Introductory and advanced concepts in geostatistics for petroleum reservoir characterization by integrating static (cores/logs/seismic traces) and dynamic (flow/transport) data; variograms and spatial correlations; regionalized variables; intrinsic random functions; kriging/cokriging; conditional simulation; non-Gaussian approaches.
Prerequisite: Introductory course in statistics or PETE 322.

PETE 631 Petroleum Reservoir Description
Credits 3.3 Lecture Hours.
Engineering and geological evaluation techniques to define the extent and internal character of a petroleum reservoir; estimate depositional environment(s) during the formation of the sedimentary section and resulting effects on reservoir character.
Prerequisites: PETE 324 and PETE 620.

PETE 632 Physical and Engineering Properties of Rock
Credits 4.3 Lecture Hours. 3 Lab Hours.
Physical and engineering properties of rock and rock masses including strength, deformation, fluid flow, thermal and electrical properties as a function of the subsurface temperature, in-situ stress, pore fluid pressure and chemical environment; relationship of rock properties to logging, sitting and design of wells and structures in rock.

PETE 633 Data Integration for Petroleum Reservoirs
Credits 3.3 Lecture Hours.
Introduction and application of techniques that can be used to incorporate dynamic reservoir behavior into stochastic reservoir characterizations; dynamic data in the form of pressure transient tests, tracer tests, multiphase production histories or interpreted 4-D seismic information.
Prerequisites: PETE 620; STAT 601.

PETE 635 Underbalanced and Managed Pressure Drilling
Credits 3.3 Lecture Hours.
This course provides an introduction and application of techniques utilized in underbalanced and managed pressure drilling; includes equipment, types of drilling fluids used (air, mist foam, etc.), flow drilling, mud cap drilling and hydraulics calculations.
Prerequisite: Graduate classification.

PETE 636 Horizontal, Multilateral and Intelligent Wells
Credits 3.3 Lecture Hours.
Advanced well architectures, primarily horizontal, multilateral and intelligent wells, all aspects of these types of wells, including well completions, reservoir flow, and wellbore flow conditions, and well deliverability; optimization of well design and field applications will be demonstrated with field cases.
Prerequisites: PETE 662; graduate classification.

PETE 637 Streamline Simulation
Credits 3.3 Lecture Hours.
Introductory and advanced concepts in streamline simulation and its applications; theory of streamlines/streamtubes in multidimensions; topics include: streamline, streamtubes, streamfunctions, transport along streamlines, spatial discretization and material balance, time stepping and transverse fluxes, impact of cell geometry, history matching and production data integration, comparison with finite difference.
Prerequisite: Graduate classification.

PETE 638 Production Logging
Credits 3.3 Lecture Hours.
Well logging methods concerned with problem well diagnosis and reservoir surveillance; includes fluid flow in pipes, understanding fluid dynamics in a wellbore, theoretical basis of production logging techniques, production log interpretation techniques, and operational considerations.
Prerequisite: Graduate classification.

PETE 639 High Performance Drilling Design and Operational Practices
Credits 3.3 Lecture Hours.
Achieving differentiating drilling performance in most complex wells; includes physics of each type of performance limiter, real time operational practices, engineering redesign practices, and effective workflows to achieve the required change in engineering and operational practices.
Prerequisites: Graduate classification, PETE 355 or PETE 661 or approval of instructor.

PETE 640 Models for Simulation of Flow and Transport of Fluids and Heat in Porous Media
Credits 4.3 Lecture Hours. 3 Lab Hours.
Design and develop numerical simulators that describe flow of reservoir fluids and transport of heat through porous media; develop multi-dimensional models capable of handling single mass components (gas, oil or water) in single phases (liquid or vapor).
Prerequisites: PETE 603 or approval of instructor; experience in FORTRAN or another programming language; solid understanding of physical processes of flow and transport through porous media, numerical analysis and linear algebra; graduate classification.

PETE 641 Models for Simulation of Advanced Coupled Processes in Geologic Media
Credits 4.3 Lecture Hours. 3 Lab Hours.
Design and develop advanced multi-phase flow processes and complex geologic media (porous and fractured, with matrix-fracture interactions); structured and unstructured grids, multiple mass components (gas, oil and water) in multi-phase states (liquid, vapor and/or liquid-vapor), and phase changes.
Prerequisites: PETE 640 and graduate classification; experience in FORTRAN95, C, C++ or another programming language; solid understanding of physical processes of flow and transport through porous media, numerical analysis and linear algebra.
PETE 642 Formation Damage: Mechanisms and Remediation
Credits 3.3 Lecture Hours.
Identification and development of solutions for mechanisms of formation damage that can occur during drilling, completion, and following chemical treatments; includes interaction of cleaning fluids with the formation brines, rock and oil.
Prerequisites: Graduate classification.

PETE 643 Oil Field Chemistry
Credits 3.3 Lecture Hours.
The role of chemistry in well stimulation, water shut-off treatments, scale removal, mitigation, downhole corrosion issues, organic deposition, dewatering, drilling fluids and various aspects of formation damage; includes problem identification as the first step in designing chemical treatment to remove formation damage.
Prerequisites: Graduate classification.

PETE 644 CO2 Capture and Uses: Sequestration, Enhanced Oil Recovery (EOR)
Credits 3.3 Lecture Hours.
Understanding the need and potential of CO2 captures and uses, including sequestration and Enhanced Oil Recovery (CCS-EOR), the scientific, technological and economic aspects of identifying and implementing a CCS-EOR; overview of safety, environmental and legal aspects.
Prerequisites: Graduate classification.

PETE 645 Upscaling of Geologic Models for Flow Simulation
Credits 3.3 Lecture Hours.
In-depth understanding of current approaches to upscaling of 3D geologic models for reservoir flow simulation; includes development of upscaling solvers.
Prerequisites: Graduate classification.

PETE 646 Reservoir Characterization and Forecasting
Credits 3.3 Lecture Hours.
Emphasis on geostatistical estimation/simulation and advanced mathematical inversion methods; integration of three important aspects of reservoir development and management: i) stochastic reservoir description, ii) reservoir model updating; and iii) model-predictive reservoir control and management.
Prerequisites: Graduate classification; basic familiarity with linear algebra, probability, statistics, differential and integral calculus and general reservoir engineering.

PETE 648 Pressure Transient Testing
Credits 3.3 Lecture Hours.
Diffusivity equation and solutions for slightly compressible liquids; dimensionless variables; type curves; applications of solutions to buildup, drawdown, multi-rate, interference, pulse and deliverability tests; extensions to multiphase flow; analysis of hydraulically fractured wells.
Prerequisites: PETE 324 and PETE 620.

PETE 650 Advanced Drilling Engineering
Credits 3.3 Lecture Hours.
Underbalanced drilling techniques, offshore drilling; horizontal, extended reach and multilateral drilling and fishing operations; geothermal drilling and high pressure, high temperature drilling.
Prerequisite: Graduate classification; PETE 405 or equivalent basic drilling engineering.

PETE 656 Advanced Numerical Methods for Reservoir Simulation
Credits 3.3 Lecture Hours.
Numerical simulation of flow in porous media based on numerical methods for partial differential equations; supplemented by published papers and research topics; development of a reservoir simulator.
Prerequisites: Graduate classification; basic reservoir simulation or equivalent course; linear algebra and matrix computations or equivalent course; advanced calculus or equivalent course; programming experience.

PETE 657/CSCE 657 High Performance Computing for Earth Science and Petroleum Engineering
Credits 3.3 Lecture Hours.
Numerical simulation of problems in Earth Sciences and Petroleum Engineering using high performance computing (HPC); development of a parallel reservoir simulator.
Prerequisite: Graduate classification.
Cross Listing: CSCE 657/PETE 657.

PETE 658 Energy and Sustainability
Credits 3.3 Lecture Hours.
Overview of energy resources and use with emphasis on long-term sustainability; considers fossil, nuclear, and alternative energy sources, electricity and transportation, energy conversions, energy efficiency, energy security, energy policy, and environmental impact.
Prerequisite: Graduate classification.

PETE 661 Drilling Engineering
Credits 3.3 Lecture Hours.
Introduction to drilling systems: wellbore hydraulics; identification and solution of drilling problems; well cementing; drilling of directional and horizontal wells; wellbore surveying abnormal pore pressure, fracture gradients, well control; offshore drilling, underbalanced drilling.

PETE 662 Production Engineering
Credits 3.3 Lecture Hours.
Development of fundamental skills for the design and evaluation of well completions, monitoring and management of the producing well, selection and design of article lift methods, modeling and design of surface facilities.

PETE 663 Formation Evaluation and the Analysis of Reservoir Performance
Credits 3.3 Lecture Hours.
Current methodologies used in geological description-analysis, formation evaluation (the analysis/interpretation of well log data), and the analysis of well performance data (the design/analysis/interpretation of well test and production data); specifically, the assessment of field performance data and the optimization of hydrocarbon recovery by analysis/interpretation/ integration of geologic, well log, and well performance data.
Prerequisite: Approval of instructor or graduate classification.

PETE 664 Petroleum Project Evaluation and Management
Credits 3.3 Lecture Hours.
Introduction to oil industry economics, including reserves estimation and classification-, building and using reservoir models, developing and using reservoir management processes, managing new and mature fields, and investment ranking and selections.

PETE 665 Petroleum Reservoir Engineering
Credits 3.3 Lecture Hours.
Reservoir description techniques using petrophysical and fluid properties; engineering methods to determine fluids in place, identify production-drive mechanisms, and forecast reservoir performance; implementation of pressure-maintenance schemes and secondary recovery.
Prerequisite: Approval of instructor or graduate classification.
PETE 667 Petroleum Engineering Reserves and Evaluation  
Credits 3. 3 Lecture Hours.  
Estimation and valuation of hydrocarbon reserves and resources, with emphasis on probabilistic methods, technically challenging reservoirs, and unconventional resources.  
Prerequisite: PETE 664, approval of instructor.

PETE 681 Seminar  
Credit 1. 1 Lecture Hour.  
Study and presentation of papers on recent developments in petroleum technology.

PETE 684 Professional Internship  
Credits 1 to 4. 1 to 4 Other Hours.  
Training under the supervision of practicing professional engineers in settings appropriate to the student's professional objectives. May be taken four times for credit.  
Prerequisite: Graduate classification and one semester of graduate work completed.

PETE 685 Directed Studies  
Credits 1 to 12. 1 to 12 Other Hours.  
Students undertake and complete limited investigations not within their thesis research and not covered in established curricula.  
Prerequisites: Graduate classification; approval of instructor.

PETE 689 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Special topics in an identified area of petroleum engineering. May be repeated for credit.

PETE 691 Research  
Credits 1 to 23. 1 to 23 Other Hours.  
Advanced work on some special problem within field of petroleum engineering. Thesis course.

PETE 692 Professional Study  
Credits 1 to 12. 1 to 12 Other Hours.  
Approved professional study or project. May be taken more than once but not to exceed 6 hours of credit towards a degree.

PHIL - Philosophy

Courses

PHIL 111 Contemporary Moral Issues  
Credits 3. 3 Lecture Hours.  
(PHIL 2306) Contemporary Moral Issues. Representative ethical positions and their application to contemporary social problems.

PHIL 205 Technology and Human Values  
Credits 3. 3 Lecture Hours.  
Interaction of personal and societal values with technology and man's self-image, the future and value change.

PHIL 208 Philosophy of Education  
Credits 3. 3 Lecture Hours.  
Basic social ideas and concepts of human nature in Western civilization; their implications for theories of education.

PHIL 240 Introduction to Logic  
Credits 3. 3 Lecture Hours.  
(PHIL 2303) Introduction to Logic. Introduction to formal methods of deductive and inductive logic including, but not limited to, truth-tables, formal deduction and probability theory.

PHIL 251 Introduction to Philosophy  
Credits 3. 3 Lecture Hours.  
(PHIL 1301) Introduction to Philosophy. Perennial problems of philosophy such as the existence of God, the mind/body relationship, the limits of knowledge, the foundations of moral judgment, man and the state.

PHIL 252/AFST 252 Introduction to Hip-Hop Philosophy  
Credits 3. 3 Lecture Hours.  
Introduction to philosophy by way of the major themes and subjects of Hip-Hop: critical advocacy of various philosophical ideals.  
Cross Listing: AFST 252/PHIL 252.

PHIL 283 Latin American Philosophy  
Credits 3. 3 Lecture Hours.  
Major philosophers in the history of Latin American philosophy, such as Unamuno, Ortega y Gasset, Vasconcelos, Caso and Gutiérrez.

PHIL 285 Directed Studies  
Credits 0 to 4. 0 to 4 Other Hours.  
Directed studies in specific problem areas of philosophy.  
Prerequisite: Approval of department head.

PHIL 289 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of philosophy. May be repeated for credit.  
Prerequisite: Approval of instructor.

PHIL 291 Research  
Credits 3. 3 Other Hours.  
Research conducted under the direction of faculty member in the department of philosophy and humanities. May be repeated for credit.  
Prerequisites: Freshman or sophomore classification and approval of department head.

PHIL 305 Philosophy of the Natural Sciences  
Credits 3. 3 Lecture Hours.  
Critical analysis of scientific methods and achievements; the nature and types of explanation, discovery and confirmation, models and theories.  
Prerequisite: 3 hours of philosophy other than PHIL 240.

PHIL 307 Philosophy of the Social Sciences  
Credits 3. 3 Lecture Hours.  
Nature and objectivity of the social sciences, their paradigms and patterns of explanation.  
Prerequisite: 3 hours of philosophy other than PHIL 240.

PHIL 314 Environmental Ethics  
Credits 3. 3 Lecture Hours.  
Moral basis of duties to preserve or protect plants, animals and environmental systems; foundations of environmental law and policy; the idea of nature in philosophy; critique of social and economic analyses of environmental values.  
Prerequisite: Sophomore classification or approval of instructor.

PHIL 315 Military Ethics  
Credits 3. 3 Lecture Hours.  
Major ethical issues in modern military practice: ethics of leadership, just war theory, killing of the innocent and the moral status of the rules of war.

PHIL 320 Philosophy of Mind  
Credits 3. 3 Lecture Hours.  
Relation of mind to body, nature of thought and knowing, the free will problem, death and immortality.  
Prerequisite: 3 hours of philosophy other than PHIL 240.
PHIL 330 Philosophy of Art
Credits 3. 3 Lecture Hours.
Theories of artistic creation and aesthetic response as exemplified in art forms such as painting, music, poetry, architecture, dance, theater, sculpture and motion pictures.

PHIL 331/RELS 331 Philosophy of Religion
Credits 3. 3 Lecture Hours.
Philosophical problems of Western religion such as the existence of God, the problem of evil, types of theism, rational, empirical and mystical approaches to God.
Cross Listing: RELS 331/PHIL 331.

PHIL 332 Social and Political Philosophy
Credits 3. 3 Lecture Hours.
Metaphysical commitments and political theory, the nature and proper ends of the state, freedom, equality, authority, and justice, considering such writers as Plato, Aristotle, Machiavelli, Locke, Rousseau, Marx, Dewey.
Prerequisite: 3 hours of philosophy other than PHIL 240.

PHIL 334 Philosophy of Law
Credits 3. 3 Lecture Hours.
Traditional legal issues such as definitions of law, relationship between law and morality, and punishment considered from a legal perspective.
Prerequisite: Junior or senior classification.

PHIL 341 Symbolic Logic
Credits 3. 3 Lecture Hours.
Elementary symbolic logic beginning with propositional calculus and first order predicate logic, and their applications.
Prerequisite: PHIL 240.

PHIL 342 Symbolic Logic II
Credits 3. 3 Lecture Hours.
Advanced topics in logic such as the theory of identity, higher order logics, logic of sets, elements of modal logic.
Prerequisite: PHIL 240 or PHIL 341, or approval of instructor.

PHIL 351 Theory of Knowledge
Credits 3. 3 Lecture Hours.
Major topics in epistemology such as the problem of induction, perception theory, memory and the problem of other minds.
Prerequisites: 3 hours of philosophy.

PHIL 352/AFST 352 Africana Philosophy
Credits 3. 3 Lecture Hours.
Presentation of the seminal ideas of several influential Africana thinkers; recovery of the neglected traditions in which these thinkers locate themselves. May be taken three times for credit.
Prerequisite: Junior or senior classification or approval of instructor.

PHIL 353/AFST 353 Radical Black Philosophies of Race and Racism
Credits 3. 3 Lecture Hours.
Critical evaluation of white supremacy, colonialism, and the modern construction of race; examination of the historical background for contemporary theories of race.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: AFST 352/PHIL 353.

PHIL 361 Metaphysics
Credits 3. 3 Lecture Hours.
Topics concerning the fundamental nature of reality such as what exists, the mental and the physical, universals and individuals, space and time, God.
Prerequisites: PHIL 240 and 3 hours of philosophy.

PHIL 371 Philosophy of Literature
Credits 3. 3 Lecture Hours.
Philosophical analysis of the major recurrent themes in world literature including fate, the meaning of tragedy, death, odyssey, good and evil, time and eternity, hope and salvation; works selected from a variety of cultures and historical periods.

PHIL 375 Philosophy of the Visual Media
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Aesthetic, ethical and epistemological issues of photography, cinema and video.

PHIL 376/FILM 376 Philosophy, Film and Evil
Credits 3. 3 Lecture Hours.
Application of philosophical methods and analyses to the medium of film; survey of various depictions and treatments of evil within the genre of science fiction; investigation of depictions and treatments of evil arising from consideration of human encounters with alien others.
Prerequisite: Junior or senior classification.
Cross Listing: FILM 376/PHIL 376.

PHIL 381 Ethical Theory
Credits 3. 3 Lecture Hours.
Values and conduct such as moral relativism, self-interest, utilitarianism, rules, nature of valuation, ethical language and argumentation.
Prerequisite: 3 hours of Philosophy other than PHIL 240.

PHIL 409/WGST 409 Studies in Gender and Philosophy
Credits 3. 3 Lecture Hours.
Analysis, from a gender-studies perspective, of a single figure or concept in the history of philosophy. May be repeated 1 time for credit with a different focus.
Prerequisites: 3 hours in philosophy and women's and gender studies; junior or senior classification.
Cross Listing: WGST 409/PHIL 409.

PHIL 410 Classical Philosophy
Credits 3. 3 Lecture Hours.
Major philosophers from 600 B.C. to the end of the third century A.D. including the Pre-Socratics, Socrates, Plato, Aristotle, Hellenistic and Roman philosophy and the Neo-Platonists.

PHIL 411 Medieval Philosophy
Credits 3. 3 Lecture Hours.
Major philosophers from the early Christian centuries through the 14th century, emphasizing such writers as Augustine, Aquinas, Duns Scotus and William of Ockham.

PHIL 412 Seventeenth-Century Philosophy
Credits 3. 3 Lecture Hours.
Significant seventeenth-century texts in metaphysics, epistemology, moral psychology, and political philosophy; authors such as Descartes, Hobbes, Spinoza, Leibniz, and Locke.
Prerequisite: Junior or senior classification or approval of instructor.

PHIL 413 Eighteenth-Century Philosophy
Credits 3. 3 Lecture Hours.
Significant eighteenth-century texts from philosophers such as Berkeley, Rousseau, Hume, and Kant.

PHIL 414 Nineteenth Century Philosophy
Credits 3. 3 Lecture Hours.
Contributions of such philosophers as Hegel, Marx, Kierkegaard, Nietzsche, Husserl, Mill and Bradley.
Prerequisite: 3 hours of philosophy.
PHIL 415 American Philosophy  
Credits 3.3 Lecture Hours.  
The thought of philosophers such as Peirce, James, Royce, Santayana, Mead, Dewey and Whitehead.  
Prerequisite: 3 hours of philosophy other than PHIL 240.

PHIL 416 Recent British and American Philosophy  
Credits 3.3 Lecture Hours.  
Major philosophers in contemporary Anglo-American thought such as Moore, Russell, Wittgenstein, Ayer, Quine, Austin and Ryle.  
Prerequisites: PHIL 240.

PHIL 417 Phenomenology  
Credits 3.3 Lecture Hours.  
Phenomenology from its nineteenth-century origins to the present; authors such as Brentano, Husserl, Scheler, Heidegger, Merleau-Ponty, Levinas, Henry, Marion.  
Prerequisites: Junior or senior classification.

PHIL 418 Existentialism  
Credits 3.3 Lecture Hours.  
Existentialism from its nineteenth-century origins to the present; philosophers such as Kierkegaard, Nietzsche, Buber, Rosenzweig, Sartre, de Beauvoir, and Camus.  
Prerequisite: PHIL 412 or 413; junior or senior classification or approval of instructor.

PHIL 419 Current Continental Philosophy  
Credits 3.3 Lecture Hours.  
Major thinkers concerned with "postmodern" topics in hermeneutics, poststructuralism, critical theory, deconstructionism, contemporary Marxist strategies, semiotics and feminist theory.  
Prerequisite: Junior classification or approval of instructor.

PHIL 424 Philosophy of Language  
Credits 3.3 Lecture Hours.  
The nature of language; the various uses of language and their philosophical import; the nature of meaning, truth, reference and issues surrounding formal representations of natural languages.  
Prerequisite: Junior classification or approval of instructor. Prerequisite: PHIL 240 and 3 additional hours of philosophy; junior or senior classification or approval of instructor.

PHIL 464/RELS 464 Modern Jewish Thought and Philosophy  
Credits 3.3 Lecture Hours.  
An overview of modern Jewish thought and philosophy spanning Jewish European thinkers from the 18th century to the 20th century.  
Prerequisite: Junior or senior classification.  
Cross Listing: RELS 464/PHIL 464.

PHIL 480 Medical Ethics  
Credits 3.3 Lecture Hours.  
Critical analysis of major ethical issues in medicine including truth telling, confidentiality, paternalism, genetics, abortion, infanticide, euthanasia and social justice in health care.

PHIL 482/ENGR 482 Ethics and Engineering  
Credits 3.2 Lecture Hours. 2 Lab Hours.  
Development of techniques of moral analysis and their application to ethical problems encountered by engineers, such as professional employee rights and whistle blowing; environmental issues; ethical aspects of safety, risk and liability; conflicts of interest; emphasis on developing the capacity for independent ethical analysis of real and hypothetical cases.  
Prerequisite: Junior classification.  
Cross Listing: ENGR 482/PHIL 482.

PHIL 484 Professional Internship  
Credits 0 to 6.0 to 6 Other Hours.  
Practical experience in an institutional or organizational setting appropriate to analysis and understanding of issues in some area of applied philosophy.  
Prerequisite: Approval of instructor and department head.

PHIL 485 Directed Studies  
Credits 0 to 6.0 to 6 Other Hours.  
Directed studies in specific problem areas of philosophy.  
Prerequisite: Approval of department head.

PHIL 489 Special Topics in...  
Credits 1 to 4.1 to 4 Lecture Hours.  
Selected topics in an identified area of philosophy. May be repeated for credit.

PHIL 491 Research  
Credits 3.3 Other Hours.  
Research conducted under the direction of faculty member in the department of philosophy and humanities. May be repeated for credit.  
Prerequisites: Junior or senior classification and approval of department head.

PHIL 497 Independent Honors Studies  
Credits 1 to 3.1 to 3 Other Hours.  
Directed independent studies in specific philosophical problems.  
Prerequisites: Junior or senior classification either as Honors students or with overall GPR of 3.25; letter of approval from head of student's major department.

PHIL 611 Ancient Philosophy  
Credits 3.3 Lecture Hours.  
Greek and Roman philosophy from 600 B.C. to 300 A.D.; emphasis on Plato and Aristotle.  
Prerequisite: Approval of instructor.

PHIL 616 Modern Philosophy  
Credits 3.3 Lecture Hours.  
Developments in philosophy from the Renaissance through the Enlightenment: Renaissance humanism and natural science, 17th- and 18th-century empiricism and rationalism, idealism; major thinkers including Descartes, Hume, Kant, Hegel.  
Prerequisite: Approval of instructor.

PHIL 620 Contemporary Philosophy  
Credits 3.3 Lecture Hours.  
19th- and 20th-century philosophical movements: phenomenology, existentialism, positivism, pragmatism, analysis, process thought. May be repeated for credit as content varies.  
Prerequisite: Approval of instructor.

PHIL 623 American Philosophy  
Credits 3.3 Lecture Hours.  
The genesis of American philosophical thought from the seventeenth century until the work of Emerson; subsequent concentration on the philosophies of Pierce, James, Royce, Dewey, Mead, Santayana and Whitehead.  
Prerequisite: Approval of instructor.

PHIL 624 Latin American Philosophy  
Credits 3.3 Lecture Hours.  
Reading and examination of the philosophical writings of some of the most important Latino/as (or Hispanic) contributors to the history of philosophy.
PHIL 630 Aesthetics
Credits 3.3 Lecture Hours.
Metaphor, the ontology of artworks, art and artifactuality, aesthetic attitudes, concepts of aesthetic appraisal such as beauty and sublimity and theory of tropes.
Prerequisite: Approval of instructor.
PHIL 631 Philosophy of Religion
Credits 3.3 Lecture Hours.
Investigation of metaphysical and epistemological issues concerning religious claims, beliefs and experiences.
Prerequisite: Approval of instructor.
PHIL 632 Social and Political Philosophy
Credits 3.3 Lecture Hours.
Theories of justice, equality, liberty and authority in social and political institutions; individualism and the social contract; political philosophy of writers such as Plato, Aristotle, Machiavelli, Locke, Rousseau, Marx, Dewey and Rawls.
Prerequisite: Approval of instructor.
PHIL 635 Ethical Theory
Credits 3.3 Lecture Hours.
Theories of moral value and conduct, moral language and argumentation; consequentialist and deontological approaches to ethics; ethical naturalism; theories of virtue.
Prerequisite: Approval of instructor.
PHIL 640 Epistemology
Credits 3.3 Lecture Hours.
Nature and origin of knowledge, skepticism, belief, truth, rationality, justification and reliability and knowledge of necessary truths.
Prerequisite: Approval of instructor.
PHIL 641 Mathematical Logic I
Credits 3.3 Lecture Hours.
The metatheory of propositional and first-order logic.
Prerequisite: Graduate classification or approval of instructor.
PHIL 642 Mathematical Logic II
Credits 3.3 Lecture Hours.
Continuation of PHIL 641: Compactness, The Lowenheim-Skolem Theorems, computability theory and Church's thesis, formal arithmetic, Godel's Incompleteness Theorems, Tarski's Theorem, and Church's Theorem. Other topics covered in the course might include systems of modal logic, intuitionistic logic, and more advanced issues in set theory.
Prerequisite: 641 or approval of instructor.
PHIL 643 History and Philosophy of Logic
Credits 3.3 Lecture Hours.
Selected topics on the historical development of logic; philosophical views of the nature of logical theory; the role of logical metatheory in the development of logic. May be repeated for credit as content varies.
Prerequisite: PHIL 341 or 641 or approval of instructor.
PHIL 645 Philosophy of Science
Credits 3.3 Lecture Hours.
Philosophy of the natural and social sciences, including the nature of theories and laws, the notion of causation, probability and determinism and the nature of theoretical change.
Prerequisite: Approval of instructor.
PHIL 646 Philosophy of a Particular Science
Credits 3.3 Lecture Hours.
Focus on methodological, epistemological and ontological issues in physics, or one of the special sciences, such as biology, psychology, cognitive science, economics. Application of philosophical methods to theoretical issues in the particular science. Relationships between theories and explanations of the particular science more basic sciences or other special sciences. May be repeated for credit for courses focusing on different sciences.
Prerequisite: Approval of instructor.
PHIL 650 Metaphysics
Credits 3.3 Lecture Hours.
Classical and contemporary treatments of the nature of reality, God, the existence of universals, space, time, causality; realism and antirealism, the existence and nature of abstract entities, the nature of events, the nature and logic of time and modality, freedom and determinism, and personal identity.
Prerequisite: Approval of instructor.
PHIL 655 Philosophy of Mind
Credits 3.3 Lecture Hours.
The mind-body problem, personal identity, thought and intentionality, action and responsibility; materialism, behaviorism, functionalism. May be repeated for credit as content varies.
Prerequisite: Approval of instructor.
PHIL 658 Philosophy of Language
Credits 3.3 Lecture Hours.
The nature of language, the various uses of language and their philosophical import, the nature of meaning, truth, reference and issues surrounding formal representations of natural languages. May be repeated for credit as content varies.
Prerequisite: Approval of instructor.
PHIL 661 Seminar in the History of Philosophy
Credits 3.3 Lecture Hours.
Intensive study of a current issue in the history of philosophy. May be repeated for credit with variation in topic.
Prerequisite: Approval of instructor.
PHIL 662 Seminar in Ethics and Value Theory
Credits 3.3 Lecture Hours.
Intensive study of current issue in ethics, ethical theory, applied ethics, aesthetics, or the work of particular philosophers in one of these areas. May be repeated for credit with variation in topic.
Prerequisite: Approval of instructor.
PHIL 663 Seminar in Metaphysics and Epistemology
Credits 3.3 Lecture Hours.
Seminar in Metaphysics or Epistemology. Intensive study of a current issue in metaphysics, epistemology, or other core areas of philosophy. May be repeated for credit with variation in topic.
Prerequisite: Approval of instructor.
PHIL 664 Seminar in Applied Philosophy
Credits 3.3 Lecture Hours.
Intensive study of a topic involving the application of philosophical concepts and theories to an issue arising in another scientific or academic field. May be repeated for credit with variation to topic.
Prerequisite: Approval of instructor.
PHIL 682 Philosophical Authors
Credits: 3. 3 Lecture Hours.
Intensive study of works of an individual important philosopher, their historical context, and criticisms and interpretations of them. May be repeated for credit with different authors.
Prerequisites: Appropriate background in history of philosophy and approval of instructor.

PHIL 683 Philosophical Pedagogy
Credit: 1. 1 Lecture Hour.
Teaching practicum for PhD students in philosophy; detailed examination of all aspects of teaching philosophy to university- and college-level students.
Prerequisite: Enrollment in PhD program in Philosophy or approval of instructor.

PHIL 684 Professional Internship
Credits: 1 to 6. 1 to 6 Other Hours.
Practical experience in an institutional or organizational setting appropriate to analysis and understanding of issues in some area of applied philosophy.
Prerequisite: Approval of committee chair and department head.

PHIL 685 Directed Studies
Credits: 1 to 6. 1 to 6 Other Hours.
Directed studies in specific problem areas in philosophy.

PHIL 689 Special Topics in...
Credits: 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of philosophy. May be repeated for credit.
Prerequisite: Approval of instructor.

PHIL 691 Research
Credits: 1 to 15. 1 to 15 Other Hours.
Research for thesis.
Prerequisites: Approval of department head and committee chair.

PHLT - Public Health

Courses

PHLT 301 Orientation to Public Health
Credit: 1. 1 Lecture Hour.
Familiarization with public health including aspects such as different disciplines within the profession; local, national and international agencies that have interest in public health and public health code of ethics.
Prerequisites: Public health major; junior or senior classification; approval of instructor.

PHLT 302 Foundations of Public Health
Credits: 3. 3 Lecture Hours.
History, philosophy, development and careers of public health; core values, ethics, concepts, functions and essential services of public health; population health and health improvement.
Prerequisites: Public health major; junior or senior classification; or approval of instructor.

PHLT 303 Social Context of Population Health
Credits: 3. 3 Lecture Hours.
Exploration of social determinants of population health and the sociocultural roots of health improvement; socio-economic, behavioral and other factors that impact human health and contribute to health improvement and health disparities.
Prerequisites: Public health major; junior or senior classification; or approval of instructor.

PHLT 304 Biological Basis of Public Health
Credits: 3. 3 Lecture Hours.
Biological mechanisms in individuals and populations affecting human health and disease; adverse health events including diseases, exposure to pathogens and toxins, and nutritional deficiencies.
Prerequisites: Public health major; junior or senior classification; or approval of instructor.

PHLT 305 Epidemiology in Public Health
Credits: 3. 3 Lecture Hours.
Principles of epidemiology, a systematic approach to collecting and evaluating information on distributions of health outcomes in populations; history of epidemiology, descriptive epidemiology, epidemiologic methods, association and causation, evidence-based public health and applications.
Prerequisites: Public health major; junior or senior classification; or approval of instructor.

PHLT 306 Border Health
Credits: 3. 3 Lecture Hours.
United States-Mexico border public health system; includes issues important to public health at the border; addresses health challenges.
Prerequisite: Public health major; junior or senior classification; or approval of instructor.

PHLT 307 Public Health in the Global Context
Credits: 3. 3 Lecture Hours.
Frameworks for understanding population health on a global scale; physical, social, cultural, geographic, political and economic interactions and interdependencies that influence global population health status.
Prerequisite: Public health major; junior or senior classification; or approval of instructor.

PHLT 308 Comparative Global Health Systems
Credits: 3. 3 Lecture Hours.
Public health issues from population health and comparative perspectives at the global level; exploration of different public health systems in developing and developed countries.
Prerequisites: Public health major; junior or senior classification; or approval of instructor.

PHLT 309 Population Health Promotion
Credits: 3. 3 Lecture Hours.
Major issues in population health promotion, including applying the concept of social determinants of health: the socio-economic, behavioral, and other factors that impact human health to address population health issues.
Prerequisites: Public health major; junior or senior classification; or approval of instructor.

PHLT 310 Public Health Writing
Credit: 1. 1 Lecture Hour.
Strategies to become more familiar with types of writing required as public health students or public health professionals; strengthens and increases general writing skills; establishes a foundation for continued development in writing. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisites: Public health major; junior or senior classification; approval of instructor.
PHLT 311 Narrative Approach to Public Health  
Credit 1. 1 Lecture Hour.  
Familiarization with the writing style required for public health; instruction in writing styles and narrative techniques to increase and strengthen writing abilities in public health disciplines such as environmental and occupational health, health promotion and community health sciences, health policy and management, epidemiology and biostatistics.  
Prerequisites: Public health major; junior or senior classification; or approval of instructor.

PHLT 313 Health Care and Public Health System  
Credits 3. 3 Lecture Hours.  
Two distinct systems – health care system: an individual and medical services model and the public health system: population level disease prevention and health education.  
Prerequisites: Public health major; junior or senior classification; or approval of instructor.

PHLT 314 Public Health Data Management and Assessment I  
Credits 2. 2 Lecture Hours.  
Familiarization with using the CDC software Epi-Info for managing, analyzing and assessing population health data; focus on using Epi-Info to produce descriptive data reports including tables and graphs.  
Prerequisite: Public health major; junior or senior classification; or approval of instructor.

PHLT 315 Public Health Data Management and Assessment II  
Credits 2. 2 Lecture Hours.  
Continuation of PHLT 314; familiarization with using the CDC software Epi-Info for managing, analyzing and assessing population health data; focus on using Epi-Info to generate inferential statistics such as confidence intervals and p-values.  
Prerequisite: Public health major; PHLT 314; or approval of instructor.

PHLT 330 The Environment and Public Health  
Credits 3. 3 Lecture Hours.  
Environmental exposures and population health; public health core knowledge; includes methods for defining environmental contamination; identifying contaminants, pathogens and toxins; assessing risks and causality; determining health impact; methods to decrease exposures.  
Prerequisites: Public health major; junior or senior classification; or approval of instructor.

PHLT 331 Occupational Safety and Health I  
Credits 3. 3 Lecture Hours.  
Regulations and topics of relevance to occupational health professionals; includes legislation and regulations, workers' compensation, accident investigation, industrial hygiene, ergonomics and fire prevention with an emphasis on the health professionals' role.  
Prerequisites: Public health major; junior or senior classification; or approval of instructor.

PHLT 332 Occupational Safety and Health II  
Credits 3. 3 Lecture Hours.  
Occupational safety and health topics including behavior-based safety, workplace violence, preparedness, hazardous materials, construction, transportation, required written programs and professional resources.  
Prerequisites: Public health major; PHLT 331; or approval of instructor.

PHLT 333 Accident Investigation  
Credits 3. 3 Lecture Hours.  
Principles of accident investigation and how accidents happen in the workplace; integrates procedural, systematic, corrective and formative applications for the occupational health professional.  
Prerequisite: Public health major; junior or senior classification; or approval of instructor.

PHLT 334 Fire Safety and Workplace Hazards  
Credits 3. 3 Lecture Hours.  
Principles of fire safety and other workplace hazards such as electrical hazards, chemical hazards, respiratory hazards, falls, confined spaces, bloodborne pathogens, hearing loss, ergonomics and machine hazards.  
Prerequisite: Public health major; junior or senior classification; or approval of instructor.

PHLT 335 Hazardous Materials  
Credits 3. 3 Lecture Hours.  
Principles of managing materials in the workplace; role of the health and safety professional in hazardous material management and hazard communication.  
Prerequisite: Public health major; junior or senior classification; or approval of instructor.

PHLT 410 Public Health Communication  
Credits 3. 3 Lecture Hours.  
Exploration of different communication approaches for addressing public health challenges; basic concepts of public health-specific communication, including risk communication, the use of mass media and evaluation of public health communication programs.  
Prerequisites: PHLT 310; public health major; or approval of instructor.

PHLT 411 Project Management in Public Health  
Credits 3. 3 Lecture Hours.  
Exploration of successful project management and administration in public health settings; includes project development, budgeting and implementation.  
Prerequisites: Public health major; junior or senior classification; or approval of instructor.

PHLT 412 Health Advocacy and Policy  
Credits 3. 3 Lecture Hours.  
Concepts of legal, ethical, economic and regulatory dimensions of public health policy; the roles, influences and responsibilities of the different agencies and branches of government; advocacy for the public's health at all levels of society.  
Prerequisites: Public health major; junior or senior classification; or approval of instructor.

PHLT 413 Public Health Informatics  
Credits 3. 3 Lecture Hours.  
Broad range of knowledge and skills encompassed by PHI; bridging public health data/information needs, information technology and stakeholders; creating user requirements to guide system design; evidence-based public health; electronic health records.  
Prerequisite: PHLT 302 or approval of instructor.

PHLT 414 Applications of Epidemiology in Public Health  
Credits 3. 3 Lecture Hours.  
Application of the concept of distribution, determinants and measurement of health and disease outcomes in populations in real life situations through lectures, case studies and presentations.  
Prerequisites: Public health major; PHLT 305; or approval of instructor.

PHLT 415 Emergency Management in Public Health  
Credits 3. 3 Lecture Hours.  
Principles and practices of emergency management at the local, state, national and international levels; explores stages of emergency management such as preparedness, response and recovery; includes population health and the basic processes, approaches and interventions; emergency management systems in the United States; actors in emergency management.  
Prerequisites: Public health major; junior or senior classification; or approval of instructor.
PHLT 416 Public Health Leadership and Ethics  
**Credits 3. 3 Lecture Hours.**  
Overview of major leadership and ethical theories, current leadership and ethical issues and their impact on public health practice.  
**Prerequisite:** Public health major; junior or senior classification; or approval of instructor.

PHLT 441 Strategies for Population Health Improvement  
**Credits 3. 3 Lecture Hours.**  
The three core functions of public health and strategies for improving population health; case studies exploring multiple types of interventions; involves class discussion, break-out groups and group assignments.  
**Prerequisite:** PHLT 302; PHLT 411 or concurrent enrollment; public health major; junior or senior classification; or approval of instructor.

PHLT 445 Population Health Culminating Experience  
**Credits 3. 3 Lecture Hours.**  
Combines knowledge and skills related to public health experience and coursework to address public health issues; process of developing, implementing and evaluating public health interventions; role assignment and responsibilities in group assignments and presentations.  
**Prerequisite:** PHLT 441 or concurrent enrollment; public health major; junior or senior classification; or approval of instructor.

PHLT 485 Directed Studies  
**Credits 1 to 4. 1 to 4 Other Hours.**  
Directed study of selected problems in the area of public health studies. May be taken four times for credit.  
**Prerequisite:** Approval of instructor.  

PHLT 489 Special Topics In...  
**Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.**  
Selected topics in an identified area of public health. May be repeated for credit.  
**Prerequisites:** PHLT major; junior or senior classification or approval of instructor.

**PHYS - Physics**

**Courses**

**PHYS 101 Freshman Physics Orientation**  
**Credit 1. 1 Lecture Hour.**  
Critical thinking skills and problem solving in physics; time management and teaming skills. For physics majors. Registration by non-majors requires approval of instructor.  
**Prerequisite:** PHYS 218 or registration therein; MATH 171 or registration therein; or approval of instructor.

**PHYS 102 Freshman Physics Orientation II**  
**Credit 1. 1 Lecture Hour.**  
Critical thinking skills and problem solving in physics; time management and teaming skills. For physics majors. Registration by non-majors requires approval of instructor.  
**Prerequisites:** PHYS 101, PHYS 208 or registration therein; MATH 172 or registration therein; or approval of instructor.

**PHYS 109/ASTR 109 Big Bang and Black Holes**  
**Credits 3. 3 Lecture Hours.**  
Designed to give an intuitive understanding of the Big Bang and Black Holes, without mathematics, and de-mystify them for the non-scientist.  
**Cross Listing:** ASTR 109/PHYS 109.

**PHYS 119/ASTR 119 Big Bang and Black Holes: Laboratory Methods**  
**Credit 1. 2 Lab Hours.**  
Hands-on understanding of the concepts surrounding the Big Bang and Black Holes; emphasis on the evidence-based decision making process, methods and presentation; for non-scientists. Companion course for ASTR 109/PHYS 109/ASTR 109.  
**Prerequisite:** ASTR/PHYS 109/ASTR 109 or registration therein.

**PHYS 201 College Physics**  
**Credits 4. 3 Lecture Hours. 3 Lab Hours.**  

**PHYS 202 College Physics**  
**Credits 4. 3 Lecture Hours. 3 Lab Hours.**  
(PHYS 1302 and 1102, 1402*) College Physics. Continuation of PHYS 201. Fundamentals of classical electricity and light; introduction to contemporary physics.  
**Prerequisite:** PHYS 201.

**PHYS 205 Concepts of Physics**  
**Credits 4. 3 Lecture Hours. 3 Lab Hours.**  
General survey physics course for K-8 preservice teachers integrating physics content and laboratory activities relevant to physics-related subject matter included in the current Texas and national standards for elementary school science; includes aspects of mechanics, waves, electricity, magnetism and modern physics.  
**Prerequisite:** Major in interdisciplinary studies or interdisciplinary technology or approval of instructor.

**PHYS 208 Electricity and Optics**  
**Credits 4. 3 Lecture Hours. 3 Lab Hours.**  
Continuation of PHYS 218. Electricity, magnetism, and introduction to optics. Primarily for students in science and engineering.  
**Prerequisites:** PHYS 218; Electricity, magnetism, and introduction to optics. Primarily for students in science and engineering.

**PHYS 218 Mechanics**  
**Credits 4. 3 Lecture Hours. 3 Lab Hours.**  
(PHYS 2325 and 2125, 2425*) Mechanics. Mechanics for students in science and engineering.  
**Prerequisite:** MATH 151 or MATH 171 or registration therein.

**PHYS 221 Optics and Thermal Physics**  
**Credits 3. 3 Lecture Hours.**  
Wave motion and sound, geometrical and physical optics, kinetic theory of gases, laws of thermodynamics.  
**Prerequisites:** PHYS 208; MATH 152 or MATH 172; registration in MATH 221, MATH 308.

**PHYS 222 Modern Physics for Engineers**  
**Credits 3. 3 Lecture Hours.**  
Atomic, quantum, relativity and solid state physics.  
**Prerequisites:** PHYS 208 or PHYS 219; MATH 308 or registration therein.

**PHYS 225 Electronic Circuits and Applications**  
**Credits 4. 3 Lecture Hours. 3 Lab Hours.**  
Linear circuit theory and applications of solidstate diodes, bipolar and field-effect transistors, operational amplifiers and digital systems.  
**Prerequisites:** PHYS 208; MATH 308.
PHYS 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Special work in laboratory or theory to meet individual requirements in cases not covered by regular curriculum; intended for use as lower-level credit.
Prerequisite: Approval of department head.

PHYS 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of physics. May be repeated for credit.
Prerequisite: Approval of instructor.

PHYS 291 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in physics. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

PHYS 302 Advanced Mechanics I
Credits 3. 3 Lecture Hours.
Classical mechanics of particles and rigid bodies, both by direct application of Newton's equations and by Lagrangian methods; applications to gravity and other central forces, coupled oscillators, non-inertial reference frames, and the statics and dynamics of fluids with and without viscosity; introduction to statics of structures.
Prerequisites: MATH 221 or MATH 251 or MATH 253; MATH 308; PHYS 208, PHYS 218, PHYS 222, and PHYS 331; concurrent enrollment in PHYS 332; for students with other backgrounds, approval of instructor.

PHYS 303 Advanced Mechanics II
Credits 3. 3 Lecture Hours.
Classical mechanics of particles and rigid bodies with an emphasis on Lagrangian and Hamiltonian methods; applications to chaos, scattering, coupled oscillations, and continua, including sound in fluids; mechanical implications of special relativity; introduction to drag and turbulence in fluids; introduction to elasticity in solids; Euler buckling instability.
Prerequisites: PHYS 302 and PHYS 332.

PHYS 304 Advanced Electricity and Magnetism I
Credits 3. 3 Lecture Hours.
Electrostatics; dielectrics; electrical current and circuits; magnetic fields and materials; induction; Maxwell's equations.
Prerequisites: PHYS 221; PHYS 331; concurrent enrollment in PHYS 332; junior or senior classification.

PHYS 305 Advanced Electricity and Magnetism II
Credits 3. 3 Lecture Hours.
Radiation and optics. Electromagnetic waves; radiation; reflection and refraction; interference; diffraction; special relativity applied to electrodynamics.
Prerequisite: PHYS 304.

PHYS 309 Modern Physics
Credits 3. 3 Lecture Hours.
Special relativity; concepts of waves and particles; introductory quantum mechanics.
Prerequisites: PHYS 221; MATH 221; MATH 308.

PHYS 327 Experimental Physics
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Laboratory experiments in modern physics and physical optics with an introduction to current, state-of-the-art recording techniques.
Prerequisites: PHYS 225; PHYS 309.

PHYS 331 Theoretical Methods for Physicists I
Credits 3. 3 Lecture Hours.
Applications involving vectors; vector and additional methods for advanced electricity and magnetism; relationship and solutions of classical wave equation, heat equation, and Schrödinger equation; harmonic motion on finite or periodic lattice and in continuum; tensor and matrix notation in classical mechanics and electricity and magnetism.
Prerequisites: MATH 221 or MATH 251 or MATH 253; MATH 308; PHYS 208 or PHYS 219, PHYS 218, and PHYS 221; restricted to physics majors.

PHYS 332 Theoretical Methods for Physicists II
Credits 3. 3 Lecture Hours.
Methods to solve the important equations of theoretical physics, emphasizing the effects of boundary conditions and quantization on their solutions and restricted to the essential physical symmetries associated with free space, spheres, cylinders, and rectangles; if time permits, introduction to symmetries in physics and to asymptotic methods.
Prerequisites: PHYS 222 or PHYS 309; PHYS 331; restricted to physics majors.

PHYS 401 Computational Physics
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Introduction to computational and simulation techniques widely used in physics applications and research, including trajectory integration, wave motion analysis, molecular dynamics, Monte Carlo methods, statistical mechanics of spin systems, phase transitions, quantum evolution, bound state problems, and variational methods.
Prerequisites: PHYS 302; PHYS 309; PHYS 331; PHYS 332; knowledge of a high level language such as FORTRAN or C (This prerequisite can be obtained by taking CSCE 206 or the equivalent.); junior or senior classification.

PHYS 408 Thermodynamics and Statistical Mechanics
Credits 4. 4 Lecture Hours.
Statistical method, macroscopic thermodynamics, kinetic theory, black body radiation, Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics.
Prerequisites: PHYS 331; PHYS 412; junior or senior classification.

PHYS 412 Quantum Mechanics I
Credits 3. 3 Lecture Hours.
Postulates of wave mechanics; wave packets; harmonic oscillator; central field problem; hydrogen atom; approximation methods.
Prerequisites: PHYS 302; PHYS 309; PHYS 332; junior or senior classification.

PHYS 414 Quantum Mechanics II
Credits 3. 3 Lecture Hours.
Continuation of PHYS 412. Electron spin; addition of angular momenta; atomic structure; time dependent perturbations; collision theory; application of quantum mechanics to atomic, solid state, nuclear or high energy physics.
Prerequisite: PHYS 412.

PHYS 420 Concepts, Connections, and Communication
Credit 1. 1 Lecture Hour.
Stars and atoms; new physics; post-Newtonian universe.
Prerequisite: Junior or senior classification.

PHYS 425 Physics Laboratory
Credits 2. 6 Lab Hours.
Experiments in nuclear, atomic, and molecular physics using modern instrumentation and equipment of current research.
Prerequisite: PHYS 327 or equivalent.
PHYS 426 Physics Laboratory
Credits 2. 6 Lab Hours.
Experiments in solid state and nuclear physics. Modern instrumentation and current research equipment are employed.
Prerequisite: PHYS 327 or equivalent.

PHYS 444 Art of Communication in Physics I: Communicating Science to Scientists
Credits 2. 2 Lecture Hours.
Communication in physics, communicating physics to scientists, scientific presentations; scientific writing; information retrieval; reading technical publications.
Prerequisite: Knowledge of oral and written English; junior or senior classification.

PHYS 445 Art of Communication in Physics II: Communicating Science to Non-Scientists
Credit 1. 1 Lecture Hour.
Communication in physics, communicating physics to scientists, scientific presentations; scientific writing; job and graduate school application; job interview.
Prerequisites: PHYS 444; knowledge of oral and written English; junior or senior classification.

PHYS 485 Directed Studies
Credits 1 to 12. 1 to 12 Other Hours.
Special work in laboratory or theory to meet individual requirements in cases not covered by regular curriculum.
Prerequisite: Approval of department head.

PHYS 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified field of physics. May be repeated for credit.
Prerequisite: Approval of instructor.

PHYS 491 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in physics. May be repeated 2 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor.

PHYS 601 Analytical Mechanics
Credits 3. 3 Lecture Hours.
Hamilton approaches to dynamics; canonical transformation and variational techniques; central force and rigid body motions; the mechanics of small oscillations and continuous systems.
Prerequisites: PHYS 302 or equivalent; MATH 311 and MATH 412 or equivalents; concurrent registration in PHYS 615.

PHYS 603 Electromagnetic Theory
Credits 3. 3 Lecture Hours.
Boundary-value problems in electrostatics; basic magnetostatics; multipoles; elementary treatment of ponderable media; Maxwell's equations for time-varying fields; energy and momentum of electromagnetic field; Poynting's theorem; gauge transformations.
Prerequisites: PHYS 304 or equivalents; PHYS 615.

PHYS 606 Quantum Mechanics
Credits 3. 3 Lecture Hours.
Schroedinger wave equation, bound states of simple systems, collision theory, representation and expansion theory, matrix formulation, perturbation theory.
Prerequisites: PHYS 412 or equivalent; MATH 311 and MATH 412 or equivalents; concurrent registration in PHYS 615.

PHYS 607 Statistical Mechanics
Credits 3. 3 Lecture Hours.
Classical statistical mechanics, Maxwell-Boltzmann distribution, and equipartition theorem; quantum statistical mechanics, Bose-Einstein distribution and Fermi-Dirac distribution; applications such as polyatomic gases, blackbody radiation, free electron model for metals, Debye model of vibrations in solids, ideal quantum mechanical gases and Bose-Einstein condensation; if time permits, phase transitions and nonequilibrium statistical mechanics.
Prerequisites: PHYS 408 and PHYS 412 or equivalents; PHYS 615.

PHYS 611 Electromagnetic Theory
Credits 3. 3 Lecture Hours.
Continuation of PHYS 603. Propagation, reflection and refraction of electromagnetic waves; wave guides and cavities; interference and diffraction; simple radiating systems; dynamics of relativistic particles and fields; radiation by moving charges.
Prerequisite: PHYS 603.

PHYS 615 Methods of Theoretical Physics I
Credits 3. 3 Lecture Hours.
Orthogonal eigenfunctions with operator and matrix methods applied to solutions of the differential and integral equations of mathematical physics; contour integration, asymptotic expansions of Fourier transforms, the method of stationary phase and generalized functions applied to problems in quantum mechanics.
Prerequisites: MATH 311, MATH 407 and MATH 412 or equivalents.

PHYS 616 Methods of Theoretical Physics II
Credits 3. 3 Lecture Hours.
Green's functions and Sturm-Liouville theory applied to the differential equations of wave theory; special functions of mathematical physics; numerical techniques are introduced; conformal mapping and the Schwarz Christoffel transformation applied to two-dimensional electrostatics and hydrodynamics.
Prerequisites: PHYS 615.

PHYS 617 Physics of the Solid State
Credits 3. 3 Lecture Hours.
Crystalline structure and symmetry operations; electronic properties in the free electron model with band effects included; lattice vibrations and phonons; thermal properties; additional topics selected by the instructor from: scattering of X-rays, electrons, and neutrons, electrical and thermal transport, magnetism, superconductivity, defects, semiconductor devices, dielectrics, optical properties.
Prerequisites: PHYS 606 and PHYS 607.

PHYS 619 Modern Computational Physics
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Modern computational methods with emphasis on simulation such as molecular dynamics and Monte Carlo; applications to condensed matter and nuclear many-body physics and to lattice gauge theories.
Prerequisites: PHYS 408 and PHYS 412 or equivalents; knowledge of any programming language.

PHYS 624 Quantum Mechanics
Credits 3. 3 Lecture Hours.
Continuation of PHYS 606. Scattering theory, second quantization, angular momentum theory, approximation methods, application to atomic and nuclear systems, semi-classical radiation theory.
Prerequisite: PHYS 606.
PHYS 625 Nuclear Physics
Credits 3.3 Lecture Hours.
Nuclear models, nuclear spectroscopy, nuclear reactions, electromagnetic properties of nuclei; topics of current interest.
Prerequisite: PHYS 606.

PHYS 627 Elementary Particle Physics
Credits 3.3 Lecture Hours.
Fundamentals of elementary particle physics; particle classification, symmetry principles, relativistic kinematics and quark models; basics of strong, electromagnetic and weak interactions.
Prerequisite: PHYS 606.

PHYS 631 Quantum Theory of Solids
Credits 3.3 Lecture Hours.
Second quantization, and topics such as plasmons; many-body effects for electrons; electron-phonon interaction; magnetism and magnons; other elementary excitations in solids; BCS theory of superconductivity; interactions of radiation with matter; transport theory in solids.
Prerequisites: PHYS 617 and PHYS 624.

PHYS 632 Condensed Matter Theory
Credits 3.3 Lecture Hours.
Prerequisites: PHYS 601, PHYS 617 and PHYS 624.

PHYS 634 Relativistic Quantum Field Theory
Credits 3.3 Lecture Hours.
Classical scalar, vector and Dirac fields; second quantization; scattering matrix and perturbation theory; dispersion relations; renormalization.
Prerequisite: PHYS 624.

PHYS 638 Quantum Field Theory II
Credits 3.3 Lecture Hours.
Functional integrals; divergences, regularization and renormalization; non-abelian gauge theories; other topics of current interest.
Prerequisite: PHYS 634.

PHYS 641/ASTR 601 Extragalactic Astronomy
Credits 3.3 Lecture Hours.
Overview of observations of galaxies and large-scale structures in the Universe to understand their formation and evolution from theoretical and observational perspectives; galaxy luminosity functions; evolution of stellar populations and chemical enrichment; clusters and AGN.
Prerequisites: PHYS 601; or ASTR 314 and PHYS 302; or approval of instructor.
Cross Listing: ASTR 601/PHYS 641.

PHYS 642/ASTR 602 Astronomical Observing Techniques and Instrumentation
Credits 3.3 Lecture Hours.
Theory and practice of obtaining and analyzing astrometric, photometric, spectroscopic, and interferometric measurements of astronomical sources across the electromagnetic spectrum; principles of design, fabrication, assembly, test, deployment, and use of astronomical instruments.
Prerequisites: PHYS 615 or equivalent; or approval of instructor.
Cross Listing: ASTR 602/PHYS 642.

PHYS 643/ASTR 603 Stellar Astrophysics
Credits 3.3 Lecture Hours.
Theoretical and observational aspects of stellar astrophysics; thermodynamical properties of stellar interiors; energy sources; nuclear processes and burning stages; convective and radiative energy transport; evolutionary models; atmospheres; stability and pulsations; chemical enrichment processes; population synthesis.
Prerequisites: PHYS 606 and PHYS 607 or equivalents; or approval of instructor.
Cross Listing: ASTR 603/PHYS 643.

PHYS 644/ASTR 604 Cosmology
Credits 3.3 Lecture Hours.
Basic principles of modern cosmology and particle physics; general relativity; cosmic inflation; Big Bang nucleosynthesis; expansion of the universe; cosmic microwave background; large-scale structure of the Universe; properties of particles; dark matter; dark energy.
Prerequisites: PHYS 615 or equivalent; or approval of instructor.
Cross Listing: ASTR 604/PHYS 644.

PHYS 645/ASTR 605 Galactic Astronomy
Credits 3.3 Lecture Hours.
Basic nature and structure of constituents of Milky Way galaxy; distribution and motions of stars and gas; origin evolution and distribution of large-scale chemical abundances and kinematic patterns across populations; models of galaxy formation and implications of modern observations.
Prerequisites: PHYS 601 and PHYS 607 or equivalents; or approval of instructor.
Cross Listing: ASTR 605/PHYS 645.

PHYS 646/ASTR 606 Radiative Transfer
Credits 3.3 Lecture Hours.
Fundamental radiative processes in stellar and planetary atmospheres; radiative fields; Stokes parameters; Mueller matrix formalism; radiation from moving charges; Compton scattering; plasma effects; atomic structure and radiative transitions; molecular structure and spectra; multiple scattering.
Prerequisites: PHYS 302, PHYS 304, PHYS 408, and PHYS 412 or equivalents; or approval of instructor.
Cross Listing: ASTR 606/PHYS 646.

PHYS 647 Gravitational Physics
Credits 3.3 Lecture Hours.
Special relativity; equivalence principle; theory of gravitation; Einstein’s theory of general relativity; classic tests of general relativity; simple black hole and cosmological solutions; global aspects; penrose diagrams; stationary black holes; Hawking radiation.
Prerequisites: PHYS 611 and PHYS 615.

PHYS 648 Quantum Optics and Laser Physics
Credits 3.3 Lecture Hours.
Line widths of spectral lines; laser spectroscopy; optical cooling; trapping of atoms and ions; coherence; pico- and femto-second spectroscopy; spectroscopic instrumentation.
Prerequisite: Approval of instructor.
PHYS 649 Physics of Optoelectronic Devices
Credits 3. 3 Lecture Hours.
Overview of basic concepts: laser physics, optics of semiconductors, heterostructures with quantum confinement and their interaction with light; physical principles of state of the art optoelectronic devices; emerging concepts and technologies: integrated photonics, nanophotonics, plasmonics, metamaterials, terahertz optoelectronics, quantum information processing, etc.  
Prerequisites: Quantum mechanics (PHYS 412 and PHYS 414 or PHYS 606 or equivalent).

PHYS 651 Superstring Theory I
Credits 3. 3 Lecture Hours.
Basics of string theory, including bosonic string, conformal field theory, strings with worldsheet and space-time supersymmetry, as well as the higher dimensional extended objects called D-branes.  
Prerequisites: PHYS 634 and PHYS 653; PHYS 647 recommended.

PHYS 652 Superstring Theory II
Credits 3. 3 Lecture Hours.
M-theory unification of superstring theories into a single eleven-dimensional theory; duality symmetries relating string theories; string geometry; Calabi-Yau manifolds and exceptional holonomy manifolds; flux compactifications; black holes in string theory; AdS/CFT correspondence; string and M-theory cosmology.  
Prerequisites: PHYS 651; PHYS 647 recommended.

PHYS 653 Introduction to Supersymmetry and Supergravity
Credits 3. 3 Lecture Hours.
Core material on supersymmetric field theories and their coupling to supergravity theories.  
Prerequisite: PHYS 634.

PHYS 654 The Standard Model and Beyond
Credits 3. 3 Lecture Hours.
The standard model of particle physics in detail; general principles of gauge theories, including spontaneous breaking and applications to Electro-Weak Interactions and Quantum Chromodynamics; extension of the standard model involving Grand Unified Theories (GUT), Supersymmetry (SUSY) and Supergravity (SUGRA).  
Prerequisites: PHYS 624 and PHYS 634.

PHYS 655 String Phenomenology
Credits 3. 3 Lecture Hours.
Physical applications of string theory; rudiments of string theory; compactification of extreme dimensions in string theory; free-fermionic formulation; dualities, M-theory, Intersection D-Branes, and D-Brane phenomenology; model building.  
Prerequisites: PHYS 634 and PHYS 651.

PHYS 666 Scientific Instrument Making
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Theory and techniques for designing and constructing advanced scientific instruments such as spectrometers, cryostats, vacuum systems, etc.; mechanical and electronic shop procedures utilizing the lathe and mill; welding and soldering; drafting and print reading; circuit design.  
Prerequisite: Approval of instructor.

PLPA - Plant Pathology

Courses

PLPA 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in plant pathology. May be repeated 3 times for credit.  
Prerequisites: Freshman or sophomore classification and approval of instructor.

PLPA 301 Plant Pathology
Credits 3. 3 Lecture Hours.
Introduction to fundamental principles of plant pathology; diagnosis, cause and control of plant diseases.  
Prerequisites: BIOL 113 or BIOL 101; concurrent registration in PLPA 303.

PLPA 303 Plant Pathology Laboratory
Credit 1. 2 Lab Hours.
Isolation, identification of plant pathogens and clinical diagnosis and control of plant diseases.  
Prerequisite: PLPA 301 or registration therein.*

PLPA 334 Turfgrass Pathology
Credits 3. 3 Lecture Hours. 0 Lab Hours.
Recognizing turfgrass problems and understanding biological mechanisms in the disease process; principles of disease management strategies.  
Prerequisite: Junior or senior classification.

PLPA 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Special problems for advanced undergraduates to permit study of subject matter not available in existing courses.  
Prerequisites: PLPA 301 and prior approval of instructor or department head.

PLPA 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of plant pathology. May be repeated for credit.  
Prerequisite: PLPA 301 or approval of instructor.
PLPA 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in plant pathology. May be repeated 3 times for credit. Registration in multiple sections of this course are possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisite: Junior or senior classification and approval of instructor.

PLPA 601 Fundamentals of Plant Pathology
Credits 3. 3 Lecture Hours.
Increase the understanding of the underlying mechanisms in the disease process; apply that understanding to reduce losses caused by disease; nature of disease causing agents; the outcomes of the interaction between plants and pathogens.
Prerequisite: Graduate classification.

PLPA 603 Plant Disease Management
Credits 3. 3 Lecture Hours.
Online course designed to provide a strong foundation in the principles and practices of management of plant diseases; analysis of disease cycles and epidemiological parameters to develop and evaluate efficient control strategies and forecasting models.
Prerequisites: PLPA 301 or equivalent, approval of instructor.

PLPA 604 Plant Bacterial Diseases
Credit 1. 1 Lecture Hour.
Bacterial diseases of fruit and vegetable crops, field crops and ornamental plants; structure and function of plant pathogenic bacteria; dissemination of bacterial pathogens and methods of control.
Prerequisite: PLPA 301 or PLPA 601.

PLPA 605 Molecular Plant Virology
Credit 1. 1 Lecture Hour.
Focus on biology and molecular genetics of plant viruses; historical information and recent developments discussed to illustrate how viruses establish an infection; control measures presented; uses as tools in biotechnology.
Prerequisite: PLPA 301 or PLPA 601.

PLPA 606 Fungal Biology
Credit 1. 1 Lecture Hour.
Morphological and molecular systematic survey of kingdom of Fungi; emphasis on modern concepts and disease control.
Prerequisite: PLPA 301 or PLPA 601.

PLPA 607 Pathogen Strategies
Credit 1. 1 Lecture Hour.
Molecular mechanisms that pathogens use to overcome innate immunity of the host plant; molecular events associated with the disease cycles of pathogens; pathogen-host-coevolution; pathogen virulence factors; pathogen countermeasures to plant defense mechanisms.
Prerequisites: PLPA 301 or PLPA 601.

PLPA 608 Pathogen Perception and Signaling
Credit 1. 1 Lecture Hour.
Molecular and biochemical basis of pathogen recognition; pathogen signaling initiation and transduction in hosts.
Prerequisite: PLPA 301 or PLPA 601.

PLPA 609 Defense Hormone Signals
Credit 1. 1 Lecture Hour.
Molecular and biochemical mechanisms of plant hormone-mediated defense responses to pathogen invasion; major classes of defense-related proteins, phytoalexins and antibacterial secondary metabolites and signal transduction pathways.
Prerequisite: PLPA 301 or PLPA 601.

PLPA 610 Host Plant Resistance
Credits 3. 3 Lecture Hours.
Host plant resistance programs from the standpoint of the plant breeder, plant pathologist and entomologist; team taught with each discipline represented; roundtable discussions of assigned readings and lectures.
Prerequisite: Approval of instructor.

PLPA 611 Advanced Plant Pathology
Credits 3. 3 Lecture Hours.
Principles and concepts of plant pathogenesis, plant disease epidemiology, and plant disease management at the level of the whole plant and in plant populations; impact and control of significant plant diseases.
Prerequisites: PLPA 301 or equivalent; approval of instructor.

PLPA 613 Advanced Plant Pathology Laboratory
Credit 1. 3 Lab Hours.
A laboratory course designed to demonstrate key components of the host-pathogen interaction and modern diagnostic and research techniques. Concurrent enrollment in PLPA 611 recommended.
Prerequisite: PLPA 301 or approval of instructor.

PLPA 614 Pathogens, the Environment, and Society
Credits 3. 3 Lecture Hours.
Survey the impact of microorganisms on development of modern culture and society; emphasize role pathogens have played in history of mankind; influence of changing environment on emerging diseases.
Prerequisite: Graduate classification.

PLPA 616 Methods in Molecular Biology of Plant-Microbe Interactions
Credits 2. 2 Lecture Hours.
Concepts and techniques used in molecular plant pathology to study the interactions between hosts and pathogens; focus on understanding the rationale for implementing certain procedures and the theoretical concepts underlying the methodology.
Prerequisite: Graduate classification.

PLPA 617 Molecular Plant Pathogen Interactions
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Critical review of the current literature on molecular and biochemical mechanisms of plant responses to pathogen invasion; overview of disease resistance genes, major classes of defense-related proteins, antimicrobial compounds and signal-transduction pathways.
Prerequisite: Graduate classification in any life sciences departments.

PLPA 618 Bacterial Plant Diseases
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Bacterial diseases of fruit and vegetable crops, field crops and ornamental plants; nature of the disease, dissemination of the pathogen and methods of control.
Prerequisite: Approval of instructor.

PLPA 619 Plant-Associated Microorganisms
Credits 3. 3 Lecture Hours.
Basic concepts and current topics in plant-microbe interactions including the diversity of plant-associated microorganisms; the plant as a microbial environment; endophytes; microbial roles in plant nutrition and fitness; uses of microorganisms for improved plant health and sustainable agriculture; microbial roles in food safety and future challenges; discussion of current literature.
Prerequisites: Basic plant biology or plant ecology is recommended; microbiology is helpful, but not required. Cross listed with HORT 619 and MEPS 619.
PLPA 620 Plant Virology
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Overview of plant virology with emphasis on molecular biology of host-virus interactions; topics will include virus replication, gene expression, movement, symptoms, transmission and control; current literature and techniques important to virology presented.
Prerequisite: Approval of instructor.

PLPA 623 Diseases of Field Crops
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Fundamental and practical aspects of more important and representative diseases of field crops; plant disease problems peculiar to extensive cultivation methods.
Prerequisites: PLPA 301 and PLPA 303.*

PLPA 626 Diagnosis of Plant Diseases
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Techniques employed in field diagnosis of plant diseases; histological and microbiological studies to verify initial diagnosis.
Prerequisite: PLPA 625 or approval of instructor.*

PLPA 630 Fungi: Physiology and Genetics
Credits 2. 2 Lecture Hours.
Exploration of genetic networks, and genome evolution; physiology of fungal development and plant pathogenesis.
Prerequisites: Graduate classification or approval of instructor and concurrent enrollment in PLPA 631.

PLPA 631 Fungi Laboratory
Credit 1. 3 Lab Hours.
Demonstration of key modern concepts in the Kingdom Fungi; experiments with current research methodologies using fungi.
Prerequisites: Graduate classification or approval of instructor and concurrent enrollment in PLPA 630 and/or PLPA 632.

PLPA 632 Fungi Cell Biology and Taxonomy
Credits 2. 2 Lecture Hours.
Fungi: Cell Biology and Taxonomy. Morphological and molecular phylegetic survey of the Kingdom Fungi; cell biology of fungal form and function.
Prerequisites: Graduate classification or approval of instructor and concurrent enrollment in PLPA 631.

PLPA 634 Turfgrass Pathology
Credits 3. 3 Lecture Hours.
Recognizing turfgrass problems and understanding biological mechanisms in the disease process; principles of disease management strategies.

PLPA 657 Biotechnology for Biofuels and Bioproducts
Credits 3. 3 Lecture Hours.
Biotechnology issues in developing bioenergy as a renewable energy source; emphasis on the three generations of bioenergy and enabling technologies; special topics include recent advances in bioenergy research, government policy, and industrial development.
Prerequisite: Graduate classification.

PLPA 665 Viral Vectors and Gene Therapy
Credits 3. 3 Lecture Hours.
Describes various viral vector systems, their development, their use as research tools, and their use in biotechnology and gene therapy; consists of a mixture of short lectures and discussion of papers from the literature.
Prerequisites: VMTI 663/MPIM 663, VMTI 647, PLPA 616, or PLPA 620 or approval of instructor.
Cross Listing: MPIM 665 and VMTI 665.

PLPA 681 Seminar
Credit 1. 1 Lecture Hour.
Reports and discussions of topics of current interest in plant pathology; review of literature on selected subjects.

PLPA 684 Professional Internship
Credits 1 to 4. 1 to 4 Other Hours.
Work-study program for on-the-job training. The student’s major professor and job training supervisor will grade the individual.
Prerequisite: Graduate classification in Department of Plant Pathology and Microbiology.

PLPA 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Individual problems or research not pertaining to thesis or dissertation.
Prerequisites: PLPA 301 and PLPA 303; approval of instructor.

PLPA 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Special topics in an identified area of plant pathology. May be repeated for credit.
Prerequisite: Approval of instructor.

PLPA 690 Theory of Research
Credit 1. 1 Lecture Hour.
Design and development of research theory, inquiry and methodology in various subfields of plant pathology and microbiology; includes examination of modern trends and advances, the analysis of research approaches, and the evaluation and interpretation of data using examples from current research literature. May be repeated for credit.
Prerequisite: Approval of instructor.

PLPA 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Original investigations in support of thesis or dissertation.

POLS - Political Science

Courses

POLS 203 Introduction to Political Theory
Credits 3. 3 Lecture Hours.
Introduction to the study of political theory, with attention to major themes in the history of political thought; discussion of the nature of politics; examination of method in political theory and its relation to the discipline of political science.

POLS 206 American National Government
Credits 3. 3 Lecture Hours.

POLS 207 State and Local Government
Credits 3. 3 Lecture Hours.
(GOV 2306) State and Local Government. Survey of state and local government and politics with special reference to the constitution and politics of Texas.

POLS 209 Introduction to Political Science Research
Credits 3. 3 Lecture Hours.
Introduction to the philosophy and practice of social science and to modes of research in major subfields of political science.
Prerequisite: Political science majors must have completed POLS 209 before they enroll in their last 18 hours of 300- and 400-level POLS courses. This means a student may take no more than 6 hours of upper division (300- and 400-level courses) before completing POLS 209. Enrollment is restricted to political science majors.
POLS 229 Introduction to Comparative Politics  
**Credits 3.3 Lecture Hours.**  
A comparison of political institutions, processes and issues across a wide variety of political systems.

POLS 231 Introduction to World Politics  
**Credits 3.3 Lecture Hours.**  
Analysis of contemporary world from point of view of nation-state; political problems, factors involved in foreign policies and relations of nations.

POLS 291 Research  
**Credits 0 to 6. 0 to 6 Other Hours.**  
Research conducted under the direction of a faculty member in political science. May be taken up to 3 times for credit.  
**Prerequisites:** Freshman or sophomore classification and approval of instructor.

POLS 300 Foundations of Political Science  
**Credits 3.3 Lecture Hours.**  
Survey of the scholarly discipline of political science, the subfields of the discipline, the major research questions and the modes of scholarship in the latter subfields, and the character of the discipline as a profession.  
**Prerequisites:** POLS 206, POLS 207, POLS 209; junior classification.

POLS 302 The Mass Media and Politics  
**Credits 3.3 Lecture Hours.**  
Examination of mass media impact on politics and political behavior, and governmental impact on the mass media.  
**Prerequisite:** POLS 206 or approval of department head.

POLS 304 Latino Politics in the United States  
**Credits 3.3 Lecture Hours.**  
Survey of historical and contemporary issues in Latino politics in the U.S.; race and ethnicity in the context of U.S. politics; comparisons of racial and ethnic group experiences in the U.S. with those experienced by racial and ethnic groups elsewhere; Latino access to the political system through political participation.  
**Prerequisite:** Junior or senior classification.

POLS 306 Contemporary Political Problems and Issues  
**Credits 3.3 Lecture Hours.**  
Major contemporary political problems and issues with primary emphasis on the U.S. Each term one to three problems or issues will be examined in some depth. Students may register in up to but no more than two different sections of this course. May be repeated for credit.  
**Prerequisite:** POLS 206 or approval of department head. NOTE: POLS 306 courses taken in a study abroad program may not count toward this limit; please consult with the undergraduate advisor.

POLS 307 The Texas Legislature  
**Credits 3.3 Lecture Hours.**  
Examination of contemporary political problems and issues in the Texas Legislature.  
**Prerequisites:** POLS 206 and POLS 207; junior or senior classification.

POLS 308 Game Theoretic Methods in Political Science  
**Credits 3.3 Lecture Hours.**  
Core concepts of game theory to study strategic interaction in politics; game theory using simple mathematical models to describe social situations, understand political and social phenomena; emphasis on model building skills and problem solving.  
**Prerequisites:** POLS 206 and junior or senior classification or approval of department head.

POLS 309 Polimetrics  
**Credits 3.3 Lecture Hours.**  
Theory, techniques, and application of quantitative analysis in political science; focus on quantitative techniques commonly used to evaluate empirical theories of politics.  
**Prerequisites:** POLS 209 or equivalent and 9 additional hours of political science or approval of instructor.

POLS 312 Ethnic Conflict  
**Credits 3.3 Lecture Hours.**  
Examination of government institutions designed to structure ethnic relations; source of ethnic conflict; mechanisms to facilitate the peaceful resolution of ethnic conflict.  
**Prerequisite:** Junior or senior classification.

POLS 313 Public Opinion  
**Credits 3.3 Lecture Hours.**  
Role of public opinion in a democratic political system–its formation, properties and patterns, with special attention to problems of linking public opinion to public policy.  
**Prerequisite:** POLS 206 or approval of department head.

POLS 314 Interest Groups  
**Credits 3.3 Lecture Hours.**  
Role of interest groups in politics; types of groups and resources; internal dynamics; group strategies/tactics (including PACs); forms of indirect and direct lobbying; influence of groups in political arena.  
**Prerequisite:** POLS 206 or approval of department head.

POLS 315 Political Parties  
**Credits 3.3 Lecture Hours.**  
Organization, history, and activities of political parties and functions they serve in national, state and local politics in the United States and elsewhere.  
**Prerequisite:** POLS 206 or approval of department head.

POLS 316 Urban Politics  
**Credits 3.3 Lecture Hours.**  
Politics at the community level; urban and metropolitan political systems.  
**Prerequisites:** POLS 206 and POLS 207 or approval of department head.

POLS 317/WGST 317 Women in Politics  
**Credits 3.3 Lecture Hours.**  
Role of women in the political system; treatment of women in political theory; effect of law on women's status; women as political leaders; current policy issues of concern to women.  
**Prerequisite:** POLS 206.

**Cross Listing:** WGST 317/POLS 317.

POLS 318 Theories of International Relations  
**Credits 3.3 Lecture Hours.**  
Examination of major paradigms of international relations; focus on theory development and application to cases.  
**Prerequisites:** POLS 206, POLS 209, and junior or senior classification or approval of department head.

POLS 319 The American Presidency  
**Credits 3.3 Lecture Hours.**  
The American Presidency and the primary relationships and responsibilities of the office, dealing with the public, decision making, influencing Congress, and implementing policy.  
**Prerequisite:** POLS 206 or approval of department head.
POLS 320 Race and Politics in the United States  
Credits 3.3 Lecture Hours.  
The politics of race in the United States: contrast of the political experiences of racial groups with the ideals and realities of democratic political systems.  
Prerequisites: POLS 206 and POLS 207 and junior or senior classification.  

POLS 322 Western European Government and Politics  
Credits 3.3 Lecture Hours.  
Political institutions and ideas of major European countries. Prospects for political integration.  
Prerequisite: POLS 206 or approval of department head.  

POLS 323 Political Systems of Latin America  
Credits 3.3 Lecture Hours.  
Survey of the major features of the political process in Latin America; key political groups and sources and characteristics of their political power; studies of selected countries.  
Prerequisite: POLS 206 or approval of department head.  

POLS 324 Politics of Global Inequality  
Credits 3.3 Lecture Hours.  
Examination of the causes and consequences of economic inequality between rich and poor states; evaluation of competing explanations for poverty of less-developed countries; development strategies employed by poor states; and structure of global economic relations.  
Prerequisite: Junior or senior classification.  

POLS 325 AFRICAN POLITICS  
Credits 3.3 Lecture Hours.  
Survey of African politics from pre-colonial period to contemporary era; examination of local experience of democracy, governance, economic development in light of varied colonial experiences, independence movements, international political economy, informal sources of political power.  
Prerequisites: POLS 206 and POLS 207; junior or senior classification.  

POLS 326 Government and Politics of Eastern Europe  
Credits 3.3 Lecture Hours.  
Political, social and economic transformations in the post-Communist Eastern and Southern European countries; examination of the interrelations between political, economic and social issues that impact the building of new governments and institutions in these countries.  
Prerequisites: POLS 206 and POLS 207; junior or senior classification.  

POLS 327 Congressional Politics  
Credits 3.3 Lecture Hours.  
Prerequisite: POLS 206 or approval of department head.  

POLS 328 Globalization and Democracy  
Credits 3.3 Lecture Hours.  
Examination of the political and economic origins of globalization; effects of globalization on advanced industrial democracies; effect on less developed nations; evaluation of the economic, social, cultural and political consequences of globalization.  
Prerequisite: Junior or senior classification.  

POLS 333 International Cooperation  
Credits 3.3 Lecture Hours.  
Contemporary issues, problems, and solutions in international cooperation.  
Prerequisites: POLS 206; junior or senior classification or approval of department head.  

POLS 335 International Conflict  
Credits 3.3 Lecture Hours.  
Examination of major theoretical explanations of war and conflict resolution.  
Prerequisites: POLS 206; junior or senior classification or approval of department head.  

POLS 338 Government and Politics of the Former Soviet Union  
Credits 3.3 Lecture Hours.  
Major political issues of the post-communist transition in the former Soviet Union.  
Prerequisite: POLS 206 or approval of department head.  

POLS 340 Introduction to Public Administration  
Credits 3.3 Lecture Hours.  
American public administration; development of public service; the political and constitutional context; organization theory; leadership and decision-making; personnel and resource staff functions; administrative law and regulation; ethics and administrative accountability.  
Prerequisite: POLS 206 or approval of department head.  

POLS 341 Urban Administration  
Credits 3.3 Lecture Hours.  
Practices and problems of city government. Organization, administration, and planning and their relation to political processes and structure.  
Prerequisites: POLS 206 and 207 or approval of department head.  

POLS 342 Politics and Bureaucracy  
Credits 3.3 Lecture Hours.  
Public bureaucracy in the context of a political environment; role of experts, the use of political power and problems of bureaucratic accountability and responsibility.  
Prerequisite: POLS 206 or approval of department head.  

POLS 347 Politics of Energy and the Environment  
Credits 3.3 Lecture Hours.  
U.S. energy and environmental problems and politics and the political, legal, and institutional factors influencing their development and implementation.  
Prerequisites: POLS 206 or approval of department head. Junior or senior classification or approval of instructor.  

POLS 349 Early Political Thought  
Credits 3.3 Lecture Hours.  
Political thought from Greek antiquity to Renaissance.  

POLS 350 Modern Political Thought  
Credits 3.3 Lecture Hours.  
Political thought from Machiavelli to Marx.  
Prerequisite: POLS 206 or approval of department head.  

POLS 351 Law and Legislation  
Credits 3.3 Lecture Hours.  
Legal, political and institutional factors that influence the passage of legislation in American legislative bodies.  
Prerequisites: POLS 206 and POLS 207; junior or senior classification.
POLS 352 Empirical Democratic Theory
Credits 3.3 Lecture Hours.
Examination of empirical political science theory about the nature and consequences of democratic government in the modern era; study of scientific theory that accounts for the rise, characteristics and behavior of democratic political systems.
Prerequisites: POLS 206, POLS 207, and POLS 209; junior or senior classification.

POLS 353 Constitutional Rights and Liberties
Credits 3.3 Lecture Hours.
Legal issues, controversies and significant developments in constitutional rights and liberties, and the impact of these developments upon American politics, culture and social institutions.
Prerequisite: POLS 206 or approval of department head.

POLS 354 United States Constitutional Development
Credits 3.3 Lecture Hours.
Leading decisions of the Supreme Court. Trends in our constitutional development since 1789; expansion through judicial interpretation of powers delegated to national government.
Prerequisites: POLS 206 and HIST 105 or approval of department head.

POLS 355 Law, Politics and Policy
Credits 3.3 Lecture Hours.
An introduction to the American legal system, its development and structure: the role of lawyers, law enforcement agencies, and interest groups in its operation; the dynamics of civil litigation and criminal processes of courts; the impact of legal policies on society, politics and the economy.
Prerequisite: POLS 206 or approval of department head.

POLS 356 National Judicial Politics
Credits 3.3 Lecture Hours.
Political factors that influence judicial selection; decision making and policy-making roles and impact of the U.S. Supreme Court and Federal Court System.
Prerequisites: POLS 206, POLS 209, and junior or senior classification or approval of department head.

POLS 357 Comparative Judicial Politics
Credits 3.3 Lecture Hours.
Survey of the major features of court systems of the world; examination of the role played by courts in the politics of selected nations of the world; comparison of judicial decision making in selected counties; the impact of courts in developing democracies.
Prerequisites: POLS 206 and 207; junior or senior classification.

POLS 358 American Political Thought
Credits 3.3 Lecture Hours.
American political thought from colonial times to the present.
Prerequisite: POLS 206 or approval of department head.

POLS 360 American State Politics
Credits 3.3 Lecture Hours.
American state governments; comparative state policies and politics.
Prerequisite: POLS 207 or approval of department head.

POLS 362 Latin American Political Thought
Credits 3.3 Lecture Hours.
Survey of various traditions in the history of Latin American political thought; key texts in the history of political theory in the Spanish-American continent.
Prerequisites: POLS 206; junior or senior classification or approval of instructor.

POLS 364 Global Political Thought
Credits 3.3 Lecture Hours.
Global perspective on the history of political ideas and contemporary political philosophy; confrontation and conversion of East Asia and Middle Eastern concepts of political problems and Western perspectives; impact of culture on the shaping of political ideas.
Prerequisite: Junior or senior classification.

POLS 365/ASIA 365 Asian Governments and Politics
Credits 3.3 Lecture Hours.
Contemporary political systems of Asia, political institutions, actors and processes.
Prerequisite: POLS 206 or approval of department head.
Cross Listing: ASIA 365/POLS 365.

POLS 367/WGST 367 Women in Government in Comparative Perspective
Credits 3.3 Lecture Hours.
Examination of women's representation in government based on comparison across multiple nation-states; focus on legislative and executive branches of democratic governments.
Prerequisites: POLS 206; junior or senior classification or approval of department head.
Cross Listing: WGST 367/POLS 367.

POLS 368 Latin American Legislatures
Credits 3.3 Lecture Hours.
Survey of the major features of the legislative branch in Latin America; examination of the role played by legislatures in the politics of selected countries; studies of executive-legislative relations in selected countries; participation by traditionally excluded groups in legislatures.
Prerequisites: POLS 206, junior or senior classification or approval of department head.

POLS 369 Theories of Democracy
Credits 3.3 Lecture Hours.
Definitions and justifications of democratic political systems; criticisms of democratic legitimacy, difficulties encountered by actual democratic regimes; methodological problems of assessing the fulfillment of democratic goals.
Prerequisite: POLS 206 or approval of instructor.

POLS 375 Campaigns and Elections
Credits 3.3 Lecture Hours.
Theories of voter choice; effects of mass media and campaign finance regulations on the conduct and outcome of elections; effects of elections on policy; emphasis on U.S. national elections.
Prerequisite: POLS 206 or approval of department head.

POLS 412 International Political Economy
Credits 3.3 Lecture Hours.
Politics of international economic relations; interactions between political and economic realms in the contemporary world.
Prerequisites: POLS 206; junior or senior classification or approval of department head.

POLS 413 American Foreign Policy
Credits 3.3 Lecture Hours.
Evolution of U.S. foreign policies since World War II. Policy process; role of executive, legislative, bureaucratic and private institutions; current foreign policy issues and problems.
Prerequisite: POLS 206 or approval of department head.
POLS 415 Contemporary Issues in American Foreign Policy
Credits 3. 3 Lecture Hours.
Detailed analysis of a selected aspect of American foreign policy.
Prerequisite: POLS 206 or approval of department head.

POLS 423 U.S.-Latin American Relations
Credits 3. 3 Lecture Hours.
Political, economic and social relations between the United States and Latin American nations from independence to the present.
Prerequisites: POLS 206, POLS 207, POLS 323; junior or senior classification.

POLS 424 Comparative Governmental Institutions
Credits 3. 3 Lecture Hours.
Study of the politics and structure of governmental institutions in a comparative venue; examination of the building blocks by which patterns of governments and institutions can be identified across various political systems of the world; role of institutions across different types of political systems and how they are affected by global economic factors.
Prerequisites: POLS 322, POLS 323, POLS 326, or POLS 365/ASIA 365; junior or senior classification.

POLS 429 Issues in World Politics
Credits 3. 3 Lecture Hours.
Selected topics of issues in contemporary world politics. May be repeated for credit.
Prerequisite: POLS 206 or approval of department head.

POLS 432 The Politics of European Union
Credits 3. 3 Lecture Hours.
Examination of the institutional, economic and political forces that led to the development of the European Economic Union; impact of the European Union on world affairs.
Prerequisites: POLS 206 and POLS 207; junior or senior classification.

POLS 435 Voting Behavior
Credits 3. 3 Lecture Hours.
Voting decisions, electoral behavior and consequences for the political system.
Prerequisite: POLS 206 or approval of department head.

POLS 439 Foreign Policy Decision Making
Credits 3. 3 Lecture Hours.
Examination of decision processes in contemporary world politics; individual, group and organizational aspects of decision making in the context of world events.
Prerequisites: POLS 206, POLS 209, and junior or senior classification or approval of department head.

POLS 440 Public Policies and Policymaking
Credits 3. 3 Lecture Hours.
Socio-economic, political, and institutional factors as they affect the development, implementation and impact of public policies. Strategies of choice by political regimes in the formation of public policies.
Prerequisite: POLS 206 or approval of department head.

POLS 441 State and Local Financial Administration
Credits 3. 3 Lecture Hours.
Financial management practices in state and local governments including the impact of management practices and political factors on revenues, expenditures, budgeting and debt financing.
Prerequisite: POLS 207.

POLS 442 Social Welfare Policy
Credits 3. 3 Lecture Hours.
Political and social issues involved in social welfare and income security policies; problems of poverty and public welfare in the United States.
Prerequisite: POLS 206 or approval of department head.

POLS 447 National Security Policy
Credits 3. 3 Lecture Hours.
Need for national security policy, the factors involved in determining defense policy and the resulting problems; special attention to the United States.
Prerequisite: POLS 206 or approval of department head.

POLS 454 Controversial Political Issues
Credits 3. 3 Lecture Hours.
Contemporary political issues such as liberalism, socialism, communism and fascism; role of ideology in political change.
Prerequisite: POLS 206 or approval of department head.

POLS 455 Traditions of Political Theory
Credits 3. 3 Lecture Hours.
Survey of particular schools or historical periods of normative political theory. May be taken three times.
Prerequisites: POLS 206 and POLS 207; junior or senior classification.

POLS 456 Environmental Political Theory
Credits 3. 3 Lecture Hours.
Examination of classical and contemporary theories of politics and the environment, overview of main lines of thought on how human beings should interact with and manage the physical environment, with attention to the particular problems raised by these issues for political theory.
Prerequisites: POLS 206; junior or senior classification.

POLS 461 Jurisprudence
Credits 3. 3 Lecture Hours.
History of legal philosophy from the ancient Greeks to the present; exploration of recurring themes such as natural law, legal positivism, legal realism, sociological jurisprudence and Marxist jurisprudence; exposure to various issues, such as liberty, privacy, obedience, responsibility and punishment.
Prerequisite: POLS 206 or approval of department head.

POLS 462/WGST 462 Women and the Law
Credits 3. 3 Lecture Hours.
The legal status of American women from the adoption of the Constitution to the present: constitutional developments; the 19th Amendment and the proposed Equal Rights Amendment; employment; family law; reproductive rights; education; sexual equality in context of other claims to equality; law and social norms.
Prerequisite: POLS 206 or approval of department head.
Cross Listing: WGST 462/POLS 462.

POLS 475 Government and the Economy
Credits 3. 3 Lecture Hours.
Constitutional and legal framework of governmental involvement in economy; governmental budget in management of business cycle; regulation of business activities; governmental economic planning in democratic societies.
Prerequisite: POLS 206 or approval of department head.
POLS 481 Research Seminar
Credits 3. 3 Other Hours.
In-depth study of topics associated with particular sub-field of political science; experience designing and implementing major, original research project.
Prerequisites: POLS 206, POLS 207, POLS 209, 12 credits in POLS at or above 300 level; junior or senior political science major or approval of instructor.

POLS 484 Internship
Credits 0 to 6. 0 to 6 Other Hours.
Directed internship in a public organization to provide students with on-the-job training and applied research experience with professionals in settings appropriate to the student's degree plan and career objectives.
Prerequisite: Approval of department head. Must be taken on a satisfactory/unsatisfactory basis.

POLS 485 Directed Studies
Credits 0 to 6. 0 to 6 Other Hours.
Individual instruction in selected aspects of political science not adequately covered by other courses.
Prerequisite: Approval of department head.

POLS 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of political science and public policy. May be repeated for credit.
Prerequisite: POLS 206 or approval of department head.

POLS 491 Research
Credits 0 to 6. 0 to 6 Other Hours.
Research conducted under the direction of a faculty member in political science. May be taken up to three times for credit.
Prerequisites: Junior or senior classification and approval of instructor.

POLS 497 Independent Honors Studies
Credits 0 to 4. 1 to 4 Other Hours.
Directed independent studies for upper division Honors students, regardless of academic major, in selected aspects of political science.
Prerequisites: Junior or senior classification either as Honors student or with overall GPR of 3.25; letter of approval from head of student’s major department.

POLS 601 Components of Political Inquiry
Credits 3. 3 Lecture Hours.
Elements of empirical research design, techniques of data collection and data analysis. The evolution of political science as a scientific discipline. Required for political science majors.
Prerequisite: Completion of or concurrent enrollment in STAT 303 or equivalent.

POLS 602 Quantitative Political Analysis
Credits 3. 3 Lecture Hours.
Theory, techniques and applications of quantitative analysis in political science. Required for political science majors.
Prerequisite: POLS 601 or equivalent.

POLS 603 Quantitative Political Analysis II
Credits 3. 3 Lecture Hours.
Introduction to advanced applications of quantitative analysis in political science; critical evaluation of the use of several advanced statistical techniques in political analysis.
Prerequisite: POLS 602 or equivalent.

POLS 604 Conceptualization and Theory in Political Analysis
Credits 3. 3 Lecture Hours.
Exploration of the function of general theoretical assumptions in social scientific research and a critical analysis of some of the most influential general conceptualizations of political phenomena.
Prerequisite: POLS 601 or equivalent.

POLS 606 Advanced Research Methods for Political Scientists
Credits 3. 3 Lecture Hours.
Advanced techniques for specialized problems in empirical political analysis, including voter choice models, longitudinal data, elite interviewing, problems of formal theory and others. May be taken three times.
Prerequisites: POLS 601 and POLS 602 or equivalents.

POLS 607 Advanced Research Methods for Political Scientists II
Credits 3. 3 Lecture Hours.
Advanced techniques for specialized problems in empirical political analysis, including voter choice models, longitudinal data, elite interviewing, problems of formal theory and others. May be taken up to three times as content varies.
Prerequisites: POLS 601 and POLS 602.

POLS 620 Comparative Political Systems
Credits 3. 3 Lecture Hours.
Comparative study of national political systems; cross-national relationships and comparative analysis.

POLS 621 Theory and Method in Comparative Politics
Credits 3. 3 Lecture Hours.
Introduction to methods for conducting research in comparative politics, including approaches to theory development and overcoming obstacles to comparative politics research.
Prerequisites: Graduate classification or approval of instructor.

POLS 623 Seminar in Cross-National Topics
Credits 3. 3 Lecture Hours.
Cross-cultural investigation of the manner in which selected political processes manifest themselves in various political systems. May be taken for credit up to three times as content varies.

POLS 624 Seminar in Regional Studies
Credits 3. 3 Lecture Hours.
Political behavior or institutions within a specified country, region or cultural area. May be taken for credit up to three times as content varies.

POLS 625 Seminar in Comparative Race and Ethnic Politics
Credits 3. 3 Other Hours.
Significant themes in comparative study of race and ethnic politics; includes racial and ethnic identities, government and diversity, racial and ethnic violence, managing conflict. May be taken three times for credit.
Prerequisite: Graduate classification.

POLS 630 International Politics
Credits 3. 3 Lecture Hours.
Survey of international politics; security politics, the development of nations, international law, organization and integration.

POLS 631 Conflict Studies
Credits 3. 3 Lecture Hours.
The study of international conflict, especially factors pertaining to the causes of war.
Prerequisite: Graduate classification or approval of instructor.
POLS 632 Theory and Method in International Relations  
Credits 3.3 Lecture Hours.  
Theory, techniques and applications of quantitative analysis in international relations.  
Prerequisites: POLS 602 and POLS 630 or approval of instructor.

POLS 633 Seminar in Foreign and Security Policy  
Credits 3.3 Lecture Hours.  
Selected aspects of the formation and conduct of foreign and defense policy. May be taken for credit up to three times as content varies.

POLS 634 International Institutions  
Credits 3.3 Lecture Hours.  
Current theoretical and empirical debates in the field of international institutions; includes the value and limitations for understanding the creation, design, behavior, change and impact of international institutions in world politics.  
Prerequisite: POLS 630.

POLS 635 International Political Economy  
Credits 3.3 Lecture Hours.  
The study of international political economy, focusing on the economic and political causes and consequences of international trade, foreign direct investment, capital mobility, exchange rate, monetary policy, migration, and development.  
Prerequisite: Graduate classification or approval of instructor.

POLS 641 Seminar in Public Administration  
Credits 3.3 Other Hours.  
Literature and research problems of a selected aspect of public administration. May be taken three times.

POLS 642 Seminar in Public Policy  
Credits 3.3 Other Hours.  
Literature and research problems of a selected aspect of public policy. May be taken three times.

POLS 643 Theory and Practice of Public Administration  
Credits 3.3 Lecture Hours.  
Theory, process and structure of management in the public sector. Internal management and behavior in federal, state or local agencies in a political setting.

POLS 644 Seminar in Politics of Race, Ethnicity and Public Policy  
Credits 3.3 Other Hours.  
Examines race, ethnicity, and public policy; emphasizes how policy process considers race and ethnicity, and differential impact of policy on racial groups. May be taken three times for credit.  
Prerequisite: Graduate classification.

POLS 645 Politics, Policy and Administration  
Credits 3.3 Lecture Hours.  
The relationship of politics and administration with reference to the influence of administration and bureaucracy, legislative bodies, parties, interest groups and other forces in the formation and execution of public policy in various levels of, primarily, American government.

POLS 646 Public Policy Theory  
Credits 3.3 Lecture Hours.  
Major theories and classifications of public policies, and general explanations of policy formation and impact; recent research testing major theories.

POLS 650 Normative Political Theory  
Credits 3.3 Lecture Hours.  
Examination of the most influential approaches, concepts and political arguments of classical and contemporary political theory. May be taken for credit up to three times as content varies.

POLS 654 Seminar in Theories of Political Legitimacy, Order and Obligation  
Credits 3.3 Lecture Hours.  
Intensive examination of contending theories of political authority, obligation and justice. May be taken up to three times for credit as content varies.  
Prerequisites: Graduate classification and approval of instructor.

POLS 660 Gateway Seminar in the Politics of Race and Ethnicity  
Credits 3.3 Lecture Hours.  
Overview of the race and ethnicity literature in four different subfields: comparative politics, international relations, American politics, and public administration/policy; emphasis on four themes across the subfields: identity participation (including non-traditional participation such as violence), representation, and institutions/structure.

POLS 670 American Political Institutions  
Credits 3.3 Lecture Hours.  
Explores the major issues and controversies in the study of American political institutions; topics include executive, legislative and judicial branches of government, as well as formal organizations such as parties and interest groups. May be taken for credit up to three times as content varies.

POLS 671 American Political Behavior  
Credits 3.3 Lecture Hours.  
An introduction to core theories and controversies about American mass political behavior; topics include public opinion, political culture, political socialization, party identification and political participation. May be taken for credit up to three times as content varies.

POLS 672 Seminar in American Political Institutions  
Credits 3.3 Lecture Hours.  
Relevant literature and research problems of selected aspects of American political institutions at the national level; emphasis on original student research. May be taken for credit up to three times as content varies.  
Prerequisite: Approval of instructor.

POLS 674 Seminar in Race, Ethnicity and American Politics  
Credits 3.3 Other Hours.  
This seminar examines social science theories of race, ethnicity and politics in the United States; highlights the political behavior of Latinos, African-Americans, and Asian Americans. May be taken three times for credit.  
Prerequisite: Graduate classification.

POLS 675 Seminar in American Political Processes and Behavior  
Credits 3.3 Lecture Hours.  
Relevant literature and research problems of selected aspects of mass political behavior in the United States; emphasis on original student research. May be taken for credit up to three times as content varies.  
Prerequisites: Approval of instructor.

POLS 681 Seminar  
Credit 1.1 Lecture Hour.  
Topics of interest to political scientists with emphasis on professional norms, opportunities and teaching strategies.  
Prerequisite: Approval of graduate advisor.

POLS 685 Directed Studies  
Credits 1 to 6.1 to 6 Other Hours.  
Individual instruction in selected fields of political science.  
Prerequisite: Approval of instructor.
POLS 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of political science or public policy. May be repeated for credit.
Prerequisite: Approval of instructor.

POLS 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
The thesis research.
Prerequisite: Approval of graduate advisor.

PORT - Portuguese

Courses

PORT 101 Beginning Portuguese I
Credits 4. 4 Lecture Hours. 1 Lab Hour.
(PORT 1411, 1511) Beginning Portuguese I. Elementary language study with aural, oral, written, and reading practice; preparation for conversation; part of class preparation done in language laboratory. Students with prior knowledge of or instruction in Portuguese are required to take a placement test before enrolling for the first time in a college Portuguese course.

PORT 102 Beginning Portuguese II
Credits 4. 4 Lecture Hours. 1 Lab Hour.
(PORT 1412, 1512) Beginning Portuguese II. Continuation of PORT 101; part of class preparation done in language laboratory. Students with prior knowledge of or instruction in Portuguese are required to take a placement test before enrolling for the first time in a college Portuguese course.
Prerequisite: PORT 101 with a grade of C or better.

PORT 201 Intermediate Portuguese I
Credits 3. 3 Lecture Hours.
(PORT 2311) Intermediate Portuguese I. Readings of average difficulty; review of grammar, practice in conversation and composition. Students with prior knowledge of or instruction in Portuguese are required to take a placement test before enrolling for the first time in a college Portuguese course.
Prerequisite: PORT 102 with a grade of C or better.

PORT 202 Intermediate Portuguese II
Credits 3. 3 Lecture Hours.
(PORT 2312) Intermediate Portuguese II. Continuation of PORT 201 with more advanced material. Students with prior knowledge of or instruction in Portuguese are required to take a placement test before enrolling for the first time in a college Portuguese course.
Prerequisite: PORT 201 with a grade of C or better.

POSC - Poultry Science

Courses

POSC 201 General Avian Science
Credits 3. 3 Lecture Hours.
(AGRI 1327) General Avian Science. Introduction to the poultry industry to include past, present and future industry dynamics; avian anatomy/physiology as they impact commercial production; management principles and practices of breeding, incubation, brooding, nutrition, disease control and marketing technology.

POSC 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed studies in specific problem areas of poultry science.
Prerequisite: Approval of instructor.

POSC 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of poultry science. May be repeated for credit.
Prerequisite: Approval of instructor.

POSC 291 Research
Credits 1 to 2. 1 to 2 Other Hours.
Research conducted under the direction of faculty member in poultry science. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor and department head.

POSC 302 Avian Science Laboratory
Credit 1. 2 Lab Hours.
Field trips and application of basic skills in production of poultry meat and eggs. Recommended supplement to POSC 201.
Prerequisite: Junior or senior classification or approval of instructor.*

POSC 304 Judging
Credits 3. 6 Other Hours.
Intensive, individualized training in selection standards for meat and egg strains of poultry, grading standards for egg and live and ready-to-cook poultry, and organizing and managing poultry shows. Practice requires visits to processing plants.
Prerequisite: Junior or senior classification or approval of instructor.*

POSC 308 Avian Anatomy and Physiology
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Anatomy and physiology of the major body systems of the bird, including the cardiovascular, gastrointestinal, respiratory, endocrine and reproductive systems; influence of the environment on bird physiology, including effects of stress. Laboratory exercises include dissection and microscopic analysis of the major body system and assessment of environmental conditions.
Prerequisites: BIOL 111; POSC 201; junior or senior classification or approval of instructor.

POSC 309 Poultry Meat Production
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Modern integrated broiler and turkey production; housing and equipment, nutrition, flock health, pest control, grower relations, marketing and financial management; lab involves blood testing, growth trials, posting birds, processing, and observation of a local integrated poultry operation.
Prerequisite: Junior or senior classification or approval of instructor.*

POSC 313 Game Birds and Ornamental Fowl
Credits 3. 3 Lecture Hours.
Commercial game bird production; nutrition, incubation, rearing, breeder care, diseases, marketing, housing requirements and economic considerations; management of rare and ornamental fowl.
Prerequisite: Junior or senior classification or approval of instructor.

POSC 319 Breeder and Hatchery Management
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Housing and equipment, incubation technology, embryology, nutrition and flock health; lab involves hatchery management, blood testing, semen evaluation, artificial insemination, basic embryology and observation of a local hatchery.
Prerequisite: Junior or senior classification or approval of instructor.

POSC 326 Commercial Egg Industry
Credits 3. 3 Lecture Hours.
Production, management, marketing, economics and integration of commercial laying hen operations.
Prerequisite: Junior or senior classification or approval of instructor.
POSC 333 Instincts and Behavior
Credits 3. 3 Lecture Hours.
Investigation of the reasoning behind evolved reproductive strategies with integration of veterinary and avian science perspectives; examination of individual differences in behavior and their development in particular environments.
Prerequisite: Junior or senior classification or approval of instructor.

POSC 381 Investigation of Professional Development in Poultry Science
Credits 2. 2 Other Hours.
An investigation of career options and the research process as applied to poultry science.
Prerequisite: Junior or senior classification or approval of instructor.

POSC 402 Skills in Poultry Evaluation
Credit 1. 2 Lab Hours.
Practical application of judging and husbandry skills used in poultry exhibition and production. Primarily designed for preservice vocational agriculture teachers.
Prerequisite: Junior or senior classification or approval of instructor.

POSC 405/FSTC 405 Egg and Poultry Meat Processing
Credits 3. 3 Lecture Hours.
Principles of egg and poultry meat processing, understanding egg and poultry meat markets, egg and meat grading, product safety, packaging and consumer acceptance of shell eggs and poultry meat; specifically turkey and broilers.
Prerequisite: Junior or senior classification or approval of instructor.

Cross Listing: FSTC 405/POSC 405.

POSC 406/FSTC 406 Poultry Further Processing
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Science and practice of value-added products; physical, chemical, microbiological and functional characteristics of value-added poultry products as they affect consumer acceptance, efficiency of production and regulatory approval.
Prerequisites: CHEM 222; DASC 326/FSTC 326/FSTC 326/DASC 326; POSC 309; POSC 405/FSTC 405; junior or senior classification or approval of instructor.

Cross Listing: FSTC 406/POSC 406.

POSC 411 Poultry Nutrition
Credits 3. 3 Lecture Hours.
Principles of poultry nutrition with emphasis on all major nutrient classes and their relationships with the avian digestive system.
Prerequisites: CHEM 222 or equivalent; junior or senior classification or approval of instructor.

POSC 412 Poultry Feed Formulation
Credit 1. 1 Lecture Hour.
Practical feeding of poultry with emphasis on specific nutrient requirements of various species and computer least cost diet formulations.
Prerequisites: POSC 411; junior or senior classification or approval of instructor.

POSC 414 Avian Genetics and Breeding
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Basic concepts of avian genetics and breeding principles, inheritance of economically important qualitative and quantitative traits; statistical analysis of breeding results; application of molecular genetics, mating systems analyses, breeder management; and incubation of hatching eggs.
Prerequisite: Junior or senior classification or approval of instructor.

POSC 425 Environmental Physiology
Credits 3. 3 Lecture Hours.
Environmental influences on the physiology of animals and humans; review of shelter engineering to promote animal welfare and production during stressful climatic conditions. Chronic and acute stress in a variety of birds and animals.
Prerequisite: Junior or senior classification or approval of instructor.

POSC 427 Animal Waste Management
Credits 3. 3 Lecture Hours.
An applied approach to current and emerging issues relating to responsible management of animal waste; the role of biological aspects of production management decisions evaluated in an examination of regulatory and environmental requirements; current case studies and exposure to field situations. Field trips may be required for which departmental fees may be assessed.
Prerequisite: Junior or senior classification or approval of instructor.

POSC 429 Advanced Food Bacteriology
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Microbiology of foodborne human pathogens of food animals, raw and processed food, and human disease; methods to control incidence of pre- and post-harvest contamination.
Prerequisites: DASC 326/FSTC 326 or FSTC 326/DASC 326 or BIOL 351 or VTPB 405; junior or senior classification.

POSC 481 Poultry Science Systems
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Individual and team approaches for the collection, interpretation, synthesis and presentation of information on integration of all aspects of the poultry industry to address issues facing it; emphasis on oral and written communication.
Prerequisite: Senior classification.

POSC 484 Internship
Credits 1 to 5. 1 to 5 Other Hours.
A supervised internship in the poultry industry to provide practical experience in a real world setting that is consistent with the student's professional interests.
Prerequisites: Junior or senior classification and approval of department head.

POSC 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed study of selected problems not covered by other courses in the department. Content of course will be adapted to interest and needs of students.
Prerequisites: Junior or senior classification and approval of instructor.

POSC 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of poultry science. May be repeated for credit.
Prerequisites: Junior or senior classification and approval of instructor.

POSC 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in poultry science. May be repeated 3 times for credit. Registration in multiple sections of this course are possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor and department head.
POSC 609 Avian Physiology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Basic physiological principles pertaining specifically to avian species; cardiovascular, neural, respiratory, digestive, endocrine and reproductive systems; physiological experiments use various avian species as laboratory animals.
Prerequisite: Approval of instructor.

POSC 611/FSTC 611 Poultry Further Processing
Credits 3. 3 Lecture Hours.
Egg and poultry meat processing; egg markets, egg processing, grading, packaging, safety, quality and consumer acceptance of shell eggs; poultry meat processing (specifically turkey and broilers), meat quality, markets, consumer acceptance of poultry meat and safety.
Cross Listing: FSTC 611/POSC 611.

POSC 614 Fermentation and Gastrointestinal Microbiology
Credits 3. 3 Lecture Hours.
Fermentation and gastrointestinal ecosystems in terms of microorganisms present, their activities and requirements and their interactions in a dynamic system.
Prerequisite: Beginning microbiology and/or biochemistry or approval of instructor.
Cross Listing: NUTR 614 and VTMI 614.

POSC 615 Avian Nutrition
Credits 3. 3 Lecture Hours.
Metabolism and nutritional requirements of domestic fowl including proteins, carbohydrates, fats, minerals, vitamins and related feed additives.
Prerequisites: POSC 411 and CHEM 228 or approval of instructor.

POSC 619 Molecular Methods for Microbial Characterization
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Underlying principles of molecular methods for microbial detection and characterization in natural and man-made ecosystems; emphasis on method application and data interpretation; emphasis on microbial pathogens and indicator organisms in foods and environment; laboratory covers select protocols.
Prerequisites: POSC 429; SCSC 405; FSTC 326/DASC 326; approval of instructor.
Cross Listing: SCSC 619, FSTC 619 and VTMI 619.

POSC 625/ANSC 623 Precision Diet Formula
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Theoretical and applied principles associated with precision feeding and diet formulation to optimize nutrient requirements; optimization using least-cost formulation, ingredient inventory, farm and feed mill management, and nutrient management of non-ruminants (poultry, swine, horse, and fish) and ruminant animals (beef and dairy).
Prerequisite: POSC 411 or ANSC 318.
Cross Listing: ANSC 623/POSC 625.

POSC 628 Advanced Poultry Meat Further Processing
Credits 3. 3 Lecture Hours.
The science and practice of value added products; physical, chemical, microbiological and functional characteristics of value-added poultry products as they affect consumer acceptance, efficiency of production and regulatory approval.
Prerequisite: Graduate classification.

POSC 629/FSTC 629 Microbiology of Food Irradiation
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Lecture plus laboratory overview of electron beam and x-ray based food irradiation principles; provides a working knowledge of using electronic pasteurization as a means of destroying microbial pathogens or retarding microbial spoilage in foods.
Cross Listing: FSTC 629/POSC 629.

POSC 630 Applied Animal Genomics
Credits 3. 3 Lecture Hours.
Theory and application of genomics by livestock industries; consideration of genetic markers, gene mapping methods, genome analysis and emerging technologies such as microarrays, transgenesis, cloning and marker assisted selection; exposure to bioinformatic tools for genomics.
Prerequisite: GENE 603 or approval of instructor.
Cross Listing: ANSC 629 and GENE 629.

POSC 634 Diseases of Poultry
Credits 3. 3 Lecture Hours.
Introduction to Poultry Biosecurity and Diseases. Basic understanding of infectious diseases of poultry; control and prevention of infectious diseases.
Prerequisites: BIOL 113/ BIOL 123.

POSC 645/NUTR 645 Nutrition and Metabolism of Vitamins
Credits 3. 3 Lecture Hours.
Chemistry and metabolism of the fat soluble and water soluble vitamins and their roles in animals; integrates cellular biochemistry and metabolism of the vitamins in the vertebrate animals.
Prerequisites: POSC 411 or ANSC 303/NUTR 303; BICH 410 or BICH 603.
Cross Listing: NUTR 645/POSC 645.

POSC 649/VTMI 649 Immunology
Credits 3. 3 Lecture Hours.
Cellular basis of the immune response; relationships between inflammation and acquired immunity, MHC and cell activation; the role of cytokines in immunoregulation and hypersensitivity, vaccines, and the mechanism of immunity to viruses, bacteria and parasites.
Prerequisite: VTPB 409 or equivalent.
Cross Listing: VTMI 649/POSC 649.

POSC 650/NUTR 650 Nutrition and Metabolism of Minerals
Credits 3. 3 Lecture Hours.
Nutritional significance of minerals in animal metabolism; chemical, biochemical and physiological role of minerals and homeostatic control in animal metabolism.
Prerequisites: POSC 411 or ANSC 303/NUTR 303; BICH 410 or BICH 603.
Cross Listing: NUTR 650/POSC 650.

POSC 660/VTMI 650 Experimental Immunology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Familiarization, development and integration of techniques into experimental design of immunologic investigation; antibody production, protein purification, immunofluorescence, agar-gel diffusion, immunoelectrophoresis and specialized serologic tests.
Prerequisites: BICH 410 or equivalent; 8 hours of microbiology.
Cross Listing: VTMI 650/POSC 660.
PSYC 209/AFST 209 Psychology of Culture and Diversity
Credits 3. 3 Lecture Hours.
Introduction to various issues surrounding an increasingly interconnected and globalized world by critically examining the dynamic relationship between psychological processes and diverse (e.g., motivation, memory, self, prejudice) socio-cultural contexts.
Prerequisite: PSYC 107.
Cross Listing: AFST 209/PSYC 209.

PSYC 210 Psychological Aspects of Human Sexuality
Credits 3. 3 Lecture Hours.
Interface between human sexuality, reproductive development, and gender roles across the lifespan; theoretical and research literature promotes understanding of hormonal influences, learning processes, cultural differences, sexual response, and love and attraction.
Prerequisite: PSYC 107.

PSYC 251 Survey of Industrial/Organizational Psychology
Credits 3. 3 Lecture Hours.
Literature and research in the basic theories and practices of I/O psychology including selection, testing, job analysis, performance appraisal, training, employee motivation, job satisfaction, leadership, and group processes within organizations. Students may not receive credit for both PSYC 251 and PSYC 352 or PSYC 251 and PSYC 353.

PSYC 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of psychology. May be repeated for credit.
Prerequisite: PSYC 107.

PSYC 300/WGST 300 Psychology of Women
Credits 3. 3 Lecture Hours.
Theoretical and research literature relevant to psychological assumptions about the female personality. How these assumptions are being questioned or verified by recent experimental studies.
Prerequisite: PSYC 107.
Cross Listing: WGST 300/PSYC 300.

PSYC 303 Psychology of Women of Color
Credits 3. 3 Lecture Hours.
Interdisciplinary theories to study the unique yet intersectional experiences of women from different racial groups, ethnicities, nationalities and cultural backgrounds; scholarly research from the diversity science field; contemporary topics that have developed in a global context; examination of complex issues, which affect women of color across the lifespan.
Prerequisite: Grade of C or better in AFST 201 or PSYC 107 or WGST 200, or approval of instructor.
Cross Listing: AFST 303 and WGST 303.

PSYC 304 Psychology of Sport and Physical Activity
Credits 3. 3 Lecture Hours.
The relationship of psychology to sport; topics include history, application of learning principles, social psychology, personality variables, psychological assessment, youth sport, women in sport, the psychology of coaching, sports law and ethics.
Prerequisite: Junior or senior classification.

PSYC 305 Psychology of Adjustment
Credits 3. 3 Lecture Hours.
Adjustment problems of normal people; application of psychological principles to family, school and community life.
PSYC 306 Abnormal Psychology  
**Credits**: 3.3 **Lecture Hours.**  
Survey of behavior pathology; functional and organic psychoses, psychoneurosis, character disorders, psychophysiological disorders, alcohol and drug addiction and mental retardation; therapeutic and diagnostic methods.  
**Prerequisites**: PSYC 107; PSYC 203 and PSYC 204 or junior or senior classification.

PSYC 307 Developmental Psychology  
**Credits**: 3.3 **Lecture Hours.**  
Growth and development of normal child from infancy to adolescence with emphasis on elementary school years.  
**Prerequisites**: PSYC 107; PSYC 203 and PSYC 204 or junior or senior classification.

PSYC 311/NRSC 311 Comparative Psychology  
**Credits**: 3.3 **Lecture Hours.**  
Survey of problems, principles, and methods of animal psychology; animal learning, motivation, discriminative processes and abnormal, social and instinctual behaviors.  
**Prerequisites**: PSYC 107; PSYC 203 and PSYC 204 or junior or senior classification.  
**Cross Listing**: NRSC 311/PSYC 311.

PSYC 315 Social Psychology  
**Credits**: 3.3 **Lecture Hours.**  
Social psychological variables operating on the individual; results of experimental laboratory findings; interaction of personality and social behavior.  
**Prerequisites**: PSYC 107; PSYC 203 and PSYC 204 or junior or senior classification.

PSYC 319 History and Systems of Psychology  
**Credits**: 3.3 **Lecture Hours.**  
Historical analysis of pre-scientific psychology in philosophy and physiology through the period of the psychological "schools."  
**Prerequisite**: PSYC 107.

PSYC 320/NRSC 320 Sensation-Perception  
**Credits**: 3.3 **Lecture Hours.**  
Review of sensory physiology, sensory and perceptual phenomena and the major perceptual theories; current research in the field.  
**Prerequisites**: PSYC 107; PSYC 203 and PSYC 204 or junior or senior classification.  
**Cross Listing**: NRSC 320/PSYC 320.

PSYC 323 Psychology of Adolescence  
**Credits**: 3.3 **Lecture Hours.**  
Psychological problems of normal teenage individual; ways and means of aiding youth to meet these problems constructively.  
**Prerequisites**: PSYC 107; PSYC 203 and PSYC 204 or junior or senior classification.

PSYC 330 Personality  
**Credits**: 3.3 **Lecture Hours.**  
Review of personality theories, techniques of assessment and research relevant to understanding individual differences.  
**Prerequisites**: PSYC 107; PSYC 203 and PSYC 204 or junior or senior classification.

PSYC 331/NRSC 331 Social Neuroscience  
**Credits**: 3.3 **Lecture Hours.**  
Integration of biological and psychological explanations of social behavior; recent research and theories in social neuroscience; emotion, motivation, aggression, face processing, empathy, social cognition, and social relationships.  
**Prerequisites**: PSYC 107 or approval of instructor; junior or senior classification.  
**Cross Listing**: NRSC 331/PSYC 331.

PSYC 332/NRSC 332 Neuroscience of Learning and Memory  
**Credits**: 3.3 **Lecture Hours.**  
Brain mechanisms of learning and memory from molecular to behavioral levels; synaptic plasticity, model systems, multiple memory systems, diseases of learning and memory.  
**Prerequisites**: PSYC 107 or approval of instructor; junior or senior classification.  
**Cross Listing**: NRSC 332/PSYC 332.

PSYC 333/NRSC 333 Biology of Psychological Disorders  
**Credits**: 3.3 **Lecture Hours.**  
Neurobiology and clinical explanation of molecular mechanisms underlying psychiatric disorders and their drug treatments; depression and bipolar, anxiety disorders, mood disorders, psychosis and schizophrenia.  
**Prerequisites**: PSYC 107, PSYC 335/NRSC 335 or one year of biology and junior or senior classification.  
**Cross Listing**: NRSC 333/PSYC 333.

PSYC 335/NRSC 335 Physiological Psychology  
**Credits**: 3.3 **Lecture Hours.**  
Physiological bases of sensation, motor functions, emotion, motivation and complex psychological processes.  
**Prerequisites**: 6 hours of biology; PSYC 203 and PSYC 204 or junior or senior classification.  
**Cross Listing**: NRSC 335/PSYC 335.

PSYC 336/NRSC 336 Drugs and Behavior  
**Credits**: 3.3 **Lecture Hours.**  
Physiological, pharmacological and behavioral effects of psychoactive drugs, including short-term and long-term effects of psychoactive drugs, properties of addictive drugs, etiology of addiction, and treatments of drug addiction and withdrawal.  
**Prerequisites**: PSYC 335/NRSC 335 or NRSC 335/PSYC 335; junior or senior classification.  
**Cross Listing**: NRSC 336/PSYC 336.

PSYC 340/NRSC 340 Psychology of Learning  
**Credits**: 3.3 **Lecture Hours.**  
Survey of significant concepts, experimental methods and principles of learning.  
**Prerequisites**: PSYC 107 or INST 301; PSYC 203 and PSYC 204 or junior or senior classification.  
**Cross Listing**: NRSC 340/PSYC 340.

PSYC 345 Human Cognitive Processes  
**Credits**: 3.3 **Lecture Hours.**  
Human cognition and information processing: perception, attention, memory, reasoning and problem solving; experimental methods and data, and contemporary theories of human cognition.  
**Prerequisites**: PSYC 107; PSYC 203 and PSYC 204; or junior or senior classification.
PSYC 346 Psychology of Language  
Credits 3. 3 Lecture Hours.
Examines theories of how language is acquired, comprehended, produced, stored and used in normal and brain-impaired individuals.  
Prerequisites: PSYC 107; or junior or senior classification.

PSYC 352 Organizational Psychology  
Credits 3. 3 Lecture Hours.
Literature and research in basic theories and practices of organizational psychology including employee motivation, leadership, job satisfaction, counterproductive work behaviors, organizational commitment, culture, climate, communication, and group processes within organizations.  
Prerequisites: PSYC 203 and PSYC 204.

PSYC 353 Personnel Psychology  
Credits 3. 3 Lecture Hours.
Literature and research in basic theories and practices of personnel psychology including job analysis, testing and validation, selection, performance appraisal, training, and legal issues in employment decision making.  
Prerequisites: PSYC 203 and PSYC 204.

PSYC 354 Conflict and Negotiation  
Credits 3. 3 Lecture Hours.
Examination of the field of conflict and negotiation, including the structure and causes of common interpersonal, intragroup, and intergroup conflicts, effective negotiation strategies, ethics, mediation, and the development of negotiating skills.  
Prerequisite: PSYC 107.

PSYC 360/NRSC 360 Health Psychology and Behavioral Medicine  
Credits 3. 3 Lecture Hours.
Survey of health psychology emphasizing behavioral and lifestyle factors in health and illness, prevention and modification of health-compromising behaviors, health care utilization, and psychological management of chronic disorders and psychological management of chronic disorders and terminal illnesses.  
Prerequisite: PSYC 107.  
Cross Listing: NRSC 360/PSYC 360.

PSYC 365 Psychology of Aging  
Credits 3. 3 Lecture Hours.
Examination of the psychological aspects of the aging process including physiology and health, memory and intellectual functioning, personality and social relationships, emotional health and late life transition.  
Prerequisite: PSYC 107.

PSYC 371 Forensic Psychology  
Credits 3. 3 Lecture Hours.
Interface between psychology and the legal system; role of psychological theories and data, as well as mental health expertise, in the resolution of criminal trials and civil disputes; legal system's impact on the practice of psychology.  
Prerequisite: PSYC 203 and PSYC 204 or junior or senior classification.

PSYC 405/RELS 405 Psychology of Religion  
Credits 3. 3 Lecture Hours.
Review of world's religions and the psychological study of the religious experience; religion within the context of personality; religious development through social interactions; religion in psychological research and therapy.  
Prerequisites: PSYC 306 and PSYC 330 or approval of instructor.  
Cross Listing: RELS 405/PSYC 405.

PSYC 407 Behavioral Disorders of Children  
Credits 3. 3 Lecture Hours.
Behavior problems related to childhood; psychological aspects of mental retardation, emotional disturbance, physical handicaps and other disorders; causative factors, preventative and therapeutic methods explored; where feasible, practical experience included as requirement.  
Prerequisites: PSYC 306; PSYC 307 or equivalent.

PSYC 411 Psychology of Self  
Credits 3. 3 Lecture Hours.
Brief review of Freud's psychology and an in-depth coverage of Jung's psychology.  
Prerequisite: PSYC 306 or PSYC 330 or approval of instructor.

PSYC 414 Behavior Principles  
Credits 3. 3 Lecture Hours.
Behavioral analysis of humans' complex interactions with their environments: how behavioral repertories are constructed during maturation process; how existent behaviors are strengthened, weakened or eliminated; and how features of environment exercise control over behavioral components within a repertory.  
Prerequisites: 9 hours of psychology; PSYC 203 and PSYC 204 or junior or senior classification.

PSYC 450 Clinical Psychology  
Credits 3. 3 Lecture Hours.
Analysis of the field of clinical psychology with a particular focus on the theoretical and scientific bases for the practice of clinical psychology.  
Prerequisites: PSYC majors only; grade of C or better in PSYC 203, PSYC 204 and PSYC 306.

PSYC 470 Psychological Testing and Measurement  
Credits 3. 3 Lecture Hours.
Theories and techniques of measurement of psychological concepts; a range of measurement models and procedures; critical tasks of evaluating strategies for measuring psychological concepts and drawing inferences and interpretations from commonly used psychological assessments.  
Prerequisites: PSYC 203; junior or senior classification or approval of instructor.

PSYC 484 Field Experiences  
Credits 3. 7 Other Hours.
Participation in an approved mental health, mental retardation, school, industrial or experimental setting; field experiences supervised by an appropriate professor within an area of student interest; course requirements vary with the setting, the supervising professor and the needs of the individual student.  
Prerequisites: PSYC 203 and PSYC 204; 12 hours of psychology; GPR of 2.5 or better in all psychology courses; approval of instructor; major in psychology.

PSYC 485 Directed Studies  
Credits 0 to 3. 0 to 3 Other Hours.
Directed readings or research problems in selected areas designed to supplement existing course offerings. Individual report required.  
Prerequisites: 12 hours of psychology including completion of PSYC 204; GPR of 2.5 or better in all psychology courses; approval of instructor; major in psychology.

PSYC 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of psychology. May be repeated for credit.  
Prerequisites: PSYC 107 and approval of instructor.
PSYC 491 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the supervision of a chosen faculty member in the department of psychology; involves discussion and weekly presentation of student research projects. May be repeated for credit.
Prerequisite: PSYC 484 or PSYC 485; junior or senior classification.

PSYC 602 MEMORY & CONSCIOUSNESS
Credits 3. 3 Lecture Hours.

PSYC 603 Motivation and Cognitive Processes
Credits 3. 3 Lecture Hours.
Selected topics in areas of motivation and higher mental processes; symbolic processes in perceptual organization; learning and remembering, reasoning and creativity.

PSYC 604 Memory and Consciousness
Credits 3. 3 Lecture Hours.
Research on consciousness and memory; all levels of conscious awareness associated with memory retrieval from detailed personal experiences of remembering to unaware uses of memory; implicit and explicit memory; automatic and controlled processes; metacognitive explorations of consciousness.
Prerequisite: Graduate classification or approval of instructor.

PSYC 605 Learning and Cognitive Processes
Credits 3. 3 Lecture Hours.
Procedural and theoretical issues in study of basic learning mechanisms in animals and humans, including Pavlovian and instrumental conditioning. Application of this work to other domains and relevant biological mechanisms also discussed.
Prerequisite: PSYC 340/NRSC 340 or approval of instructor.
Cross Listing: NRSC 606/PSYC 606.

PSYC 606 Experimental Psychology
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Experimental methods; developing a general frame of reference for approaching experimental research problems.

PSYC 607 Introduction to Clinical Ethics and Techniques
Credits 3. 3 Lecture Hours.
Ethical and legal issues in clinical practice; development of listening and interpretation skills; supervised practicum in interviewing non-clinical subjects; structured role-play of clinical situations.
Prerequisite: Approval of instructor.

PSYC 609/ NRSC 609 Physiological Psychology
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Current research and methodological procedures on physiological bases of sensation-perception, memory and learning, arousal-sleep-attention, emotions and motivation.
Prerequisite: PSYC 335/NRSC 335.
Cross Listing: NRSC 609/PSYC 609.

PSYC 610 Organizational Psychology
Credits 3. 3 Lecture Hours.
Current literature and research in employee motivation, satisfaction, leadership, communication, group conflict and other group processes.

PSYC 611 Personnel Psychology
Credits 3. 3 Lecture Hours.
Application of psychological principles and research methods to the areas of selection, placement, job analysis, performance appraisal and training.
Prerequisite: PSYC 351 or equivalent and graduate classification or approval of instructor.

PSYC 613 Practicum in Psychological Assessment
Credits 1 to 4. 1 to 4 Other Hours.
Application of psychological assessment across the life-span; assessment of cognitive, intellectual, academic, and memory abilities and adaptive behavior; assessment of personality, behavioral style, and systems/environment; integration of assessment measures in comprehensive psychological evaluations; attendance required at Practicum Seminar designed to integrate research, coursework, and applied training and supervisory instruction from a faculty supervisor; at least 3 credits and no more than 18 credits applied to degree plan.
Prerequisite: PSYC 623 and PSYC 624, or approval of instructor.

PSYC 614 Practicum in Psychology
Credits 1 to 6. 1 to 6 Other Hours.
Practical on-the-job experience for graduate students. Activities will be guided by psychologists in the following areas: behavior modification, social, clinical, experimental and industrial. Supervision will be provided by members of University staff. May be taken more than once but not to exceed 18 hours of credit toward a graduate degree.
Prerequisite: Approval of instructor.

PSYC 615/NRSC 615 Perceptual Processes
Credits 3. 3 Lecture Hours.
Complex sensory and perceptual phenomena with emphasis on the relationship between perception and motivation, cognition, creativity and instinctive/ethological; learning/experiential factors in higher level perceptual processes.

PSYC 616 Treatment of Problem Behavior in Children and Families
Credits 3. 3 Lecture Hours.
Current methods of treating families with children displaying aggressive, hyperactive, underachieving and other problem behaviors in natural settings; behavior of children and adolescents at home, school and at play.
Prerequisite: Approval of instructor.

PSYC 617 Analytical Psychology
Credits 3. 3 Lecture Hours.
Survey emphasizing Jungian psychology but including coverage of Freudian psychology; application of analytical principles and concepts to a variety of clinical issues and situations.
Prerequisite: Approval of instructor.

PSYC 618 Psychology of Persuasion
Credits 3. 3 Lecture Hours.
Theory and scientific evidence regarding strategies and tactics of persuasion; explores theoretical controversies and presents potential integrations.

PSYC 619 History and Systems of Psychology
Credits 3. 3 Lecture Hours.
Historical examination of scientific psychology's antecedents in philosophy and physiology; early systems of psychology including structuralism, functionalism, behaviorism, Gestalt psychology and psychoanalysis.
Prerequisite: Graduate classification.

PSYC 620 Theories of Social Psychology
Credits 3. 3 Lecture Hours.
Current theories of social psychology and a review of related studies to these theories; theories of attitude change, prosocial behavior, aggression, equity, coalition formation, social learning and S-R theory applied to social behavior.
Prerequisite: PSYC 315 or SOCI 411.
PSYC 621 Seminar in Social Psychology
Credits 3.3 Other Hours.
Attitudes and persuasion; small group interaction and performance; prosocial behavior; aggression; self concept; applied social problems; gender differences in social interaction; and social cognition. May be repeated up to three times for credit.
Prerequisite: Approval of instructor.

PSYC 622 Emotions: Neuroscience, Cognitive, & Social Approaches
Credits 3.3 Lecture Hours.
Emotions: Neuroscience, Cognitive, & Social Approaches. Overview of the issues in the scientific study of emotions; focus on neuroscience, cognitive, and social approaches; introduction to theory and research in major areas of emotions research.
Prerequisite: Graduate classification.

PSYC 623 Psychological Assessment I
Credits 3.3 Lecture Hours.
Principles of psychological testing; uses and critical evaluation of tests of achievement, intelligence, aptitude and personality.

PSYC 624 Psychological Assessment II
Credits 3.3 Lecture Hours.
Theory and application of psychological assessment of children, adolescents, and adults; assessment of cognitive, intellectual, academic, and memory abilities and adaptive behavior; integration of assessment measures in comprehensive psychological evaluations.
Prerequisite: PSYC 623 or approval of instructor.

PSYC 625 Psychopathology
Credits 3.3 Lecture Hours.
Various symptom categories in psychopathology including differing theoretical conceptualizations of these symptom categories, and theories and research concerning etiology and treatment.

PSYC 626 Psychological Assessment of Children and Adolescents
Credits 3.3 Lecture Hours.
Theory and application of psychological assessment of children, adolescents, and adults; assessment of cognitive, intellectual, academic, and memory abilities and adaptive behavior; assessment of personality, behavioral style, family functioning, and child-focused systems; integration of assessment measures in comprehensive psychological evaluations.
Prerequisite: PSYC 624 or approval of instructor.

PSYC 628 Behavior Disorders in Children
Credits 3.3 Lecture Hours.
Different systems of classification including research and theory about the origins and anticipated outcomes of various emotional disorders; families of disturbed children; major treatment approaches and community resources for intervention.
Prerequisites: PSYC 407 or equivalent and graduate classification or approval of instructor.

PSYC 629 Seminar in Clinical/Community Psychology
Credits 3.3 Other Hours.
Assessment and treatment of specific clinical disorders such as depression, sexual dysfunctions and deviations, anxiety-based disorders, autism, marital distress and psychophysiological disorders. May be repeated up to three times for credit.
Prerequisites: PSYC 608 and PSYC 626; PSYC 623 or equivalent.

PSYC 630 Health Psychology and Behavioral Medicine
Credits 3.3 Lecture Hours.
Theory, research and practice of health psychology emphasizing the prevention and modification of health compromising behaviors; psychological management of stress, pain and chronic/terminal illness; effective interventions for specific health behaviors/disorders.
Prerequisite: Graduate classification.

PSYC 633 Gender and Minority Issues in Clinical Psychology
Credits 3.3 Lecture Hours.
Human behavior and mental health as a function of culture, gender and sexual orientation; discussion of absolutist, relativist and universalist perspectives in cross-cultural psychology; psychology of stereotype and prejudice; adjustment through acculturation and biculturalism; learning about our own and other cultures.

PSYC 634 Principles of Human Development
Credits 3.3 Lecture Hours.
Biological, psychological and cultural interrelationships in human development; principles and methods as illustrated in research and theoretical contributions; experiences in procedures of child study.
Prerequisite: Graduate classification.

PSYC 635 Behavioral and Cellular Research Seminar
Credits 2.2 Other Hours.
Expose graduate students to neuroscience research, theory, and proposal development; research presentations by guest speakers, faculty, and graduate students; Discussions, readings and presentations on issues related to research design, statistics, methodology, ethics, IACUC, grant writing, presentation skills, job talks, and other relevant topics. May be taken four times for credit.
Prerequisite: Graduate classification.

PSYC 636 Seminar in Developmental Psychology
Credits 3.3 Other Hours.
Cognitive development; social and emotional development; developmental abnormalities in connection with social/emotional and cognitive development; language acquisition; family processes; and development during infancy; recent developments in these fields. Topics will vary from semester to semester; may be repeated for credit up to three times as topics change.
Prerequisite: Graduate classification.

PSYC 637 Clinical Interventions I
Credits 3.3 Lecture Hours.
Theory, research and techniques related to evidence-based behavioral and cognitive-behavioral approaches to clinical interventions; ethical, professional, multicultural and history/systems issues in therapeutic psychological interventions.
Prerequisite: Enrollment in Clinical Psychology Graduate Program or approval of instructor.

PSYC 638 Clinical Interventions II
Credits 3.3 Lecture Hours.
Theory, research, and techniques related to evidence-based interpersonal, psychodynamic, group therapy, and family therapy approaches to clinical interventions; ethical, professional, multicultural, and history/systems issues in therapeutic psychological interventions.
Prerequisite: Enrollment in Clinical Psychology Graduate Program or approval of instructor.
PSYC 639 Pediatric Psychology
Credits 3. 3 Lecture Hours.
Application of clinical/counseling/school psychology to children and adolescents with chronic illnesses or disabilities and their families; theoretical foundations and models for consultation, assessment and intervention strategies; unique ethical and professional issues associated with research and service delivery in child health psychology/pediatric behavioral medicine.
Prerequisite: Approval of instructor.

PSYC 649/NRSC 649 Seminar in Behavioral Neuroscience
Credits 3. 3 Lecture Hours.
Behavioral neuroscience; including behavioral pharmacology, neuropharmacology, methods and techniques, drug reinforcement, behavioral toxicology, pain perception and ingestive behavior. May be repeated up to three times for credit.
Prerequisites: PSYC 606/NRSC 606 or equivalent; PSYC 609/NRSC 609; graduate classification.
Cross Listing: NRSC 649/PSYC 649.

PSYC 650/NRSC 650 Clinical Psychopharmacology
Credits 3. 3 Lecture Hours.
Survey of topics in clinical psychopharmacology, including pharmacodynamics, major neurotransmitter systems, and therapeutic applications and limitations.
Prerequisite: Graduate classification or approval of instructor.
Cross Listing: NRSC 650/PSYC 650.

PSYC 670 Professional Seminar in Social Psychology
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Survey of recent theoretical, methodological and empirical developments in social psychology; different topics each semester will include theory and research on attitudes and persuasion, social cognition, interpersonal relationships, group processes, social development, and personality and social behavior. May be taken for credit up to eight times.
Prerequisite: Enrollment in the psychology PhD program.

PSYC 671/NRSC 671 Experimental Design for Behavioral Scientists
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Intensive practical study of designs of special interest to behavioral scientists; repeated measures designs.
Prerequisite: STAT 652 or equivalent.
Cross Listing: NRSC 671/PSYC 671.

PSYC 678/CPSY 678 Couples Therapy
Credits 3. 3 Lecture Hours.
Theory and practice of marital therapy emphasizing systems and communication approaches; effective strategies and techniques; therapy with specific marital problems and obstacles to effective therapy.
Prerequisites: CPSY 631; CPSY 639 or equivalent.
Cross Listing: CPSY 678/PSYC 678.

PSYC 680 Seminar in Organizational Psychology
Credits 3. 3 Other Hours.
Areas of organizational psychology: job stress, socialization processes, motivation, leadership, person perception in organizations, conflict management. May be repeated up to five times for credit; content will vary by semester.
Prerequisite: PSYC 610 or approval of instructor.

PSYC 681 Industrial/Organizational Psychology
Credits 1 to 3. 1 to 3 Lecture Hours.
Both research and applied colloquia provided by I/O psychologists and individuals in related disciplines.
Prerequisite: Graduate classification.

PSYC 682 Seminar in Personnel Selection and Placement
Credits 3. 3 Other Hours.
Personnel selection and placement including job analysis and evaluation, psychological testing, test development, psychometric theory, theories of test fairness, validity generalization, utility theory, performance appraisal and selection/placement decision models. May be repeated up to five times for credit; content will vary by semester.
Prerequisite: PSYC 611 or approval of instructor.

PSYC 684 Professional Internship
Credits 1 to 12. 1 to 12 Other Hours.
Full-time clinical experience in a departmentally-approved internship training facility. Limited to advanced doctoral students specializing in clinical psychology. May be taken up to 12 hours total.

PSYC 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed individual study of selected problem in psychology or special topics to fit small group requirements.
Prerequisite: Approval of instructor.

PSYC 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of psychology. May be repeated for credit.
Prerequisite: Graduate classification.

PSYC 690 Cognoscenti: Professional Issues in Cognitive Psychology
Credits 2. 2 Lecture Hours.
Introduction to current themes in research, theory and practice in cognitive psychology; presentations by guest speakers from within and outside the University.
Prerequisite: Graduate enrollment in psychology.

PSYC 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research for thesis.

PSYC 697 Seminar in the Teaching of Introductory Psychology
Credits 3. 3 Lecture Hours.
Introductory methods relevant to teaching psychology; for graduate students assisting in the teaching of PSYC 107.
Prerequisite: Graduate classification.

RDNG - Reading

Courses
RDNG 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in reading. May be repeated two times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

RDNG 351 Reading in the Elementary School
Credits 3. 3 Lecture Hours.
Recent trends, issues, materials and procedures considered essential for effective teaching of reading, such as comprehension, word analysis, study skills, motivation, grouping, etc.
Prerequisites: Concurrent enrollment in RDNG 361; junior classification or approval of department head.
RDNG 361 Assessment in Reading Instruction
Credits 3.3 Lecture Hours.
Evaluation and use of commonly used achievement tests, development of criterion referenced tests and interpretation and construction of informal measures for assessing reading skills.
Prerequisites: Concurrent enrollment in RDNG 351; junior classification or approval of department head.

RDNG 371 Multicultural and Interdisciplinary Literature for Middle Grades
Credits 3.3 Lecture Hours.
Focuses on multicultural and interdisciplinary literature appropriate for middle grades students; implements and evaluates effective multicultural, interdisciplinary instruction through selection, use and development of literature in middle grades classroom.
Prerequisite: RDNG 351, RDNG 361.
Corequisite: INST 322 recommended.

RDNG 372 Reading and Writing across the Middle Grades Curriculum
Credits 3.3 Lecture Hours.
Acquaints middle-grade educators to reading and writing instruction in content area education; focuses on development of grade-appropriate reading/writing competencies and educational techniques appropriate to student development in various subjects.
Prerequisite: RDNG 351.

RDNG 450 Language and Reading
Credits 3.3 Lecture Hours.
Relationship between language and reading, dialect and reading, and linguistics.

RDNG 461 Teaching Reading Through Children’s Literature
Credits 3.3 Lecture Hours.
Use of past and contemporary literature for the motivation of wide leisure reading in the elementary grades.
Prerequisites: RDNG 351, RDNG 361.

RDNG 465 Reading in the Middle and Secondary Grades
Credits 3.3 Lecture Hours.
Reading needs of middle and secondary school students with emphasis upon curriculum organization for reading development and assessment of student progress in content area reading.

RDNG 467 Reading and the Language Arts
Credits 3.2 Lecture Hours. 3 Lab Hours.
Recent trends, issues and research on the impact of listening, oral language, process writing, grammar, spelling and handwriting on the development of reading strategies and communicative competence. Application of research in field settings.
Prerequisites: RDNG 351 and RDNG 361; admission to teacher education. Must be taken concurrently with TEFB 410, TEFB 412 and TEFB 413.

RDNG 468 Essential Foundations of Language and Literacy for All Learners
Credits 3.3 Lecture Hours.
Relationship among literacy, language, dialect and linguistics; role of the child, community and school through stages of literacy and second language learning; literacy instructional procedures for all learners including dyslexia.
Prerequisites: RDNG 351 or RDNG 372 or SPED 412.

RDNG 469 Assessment in Reading Instruction in Middle Grades
Credits 3.2 Lecture Hours. 6 Other Hours.
Evaluation of middle grades students reading performance; selection, understanding, and implementation of formal and informal evaluation procedures in classroom reading assessment, diagnosis, and instruction.
Prerequisites: RDNG 352; admission to teacher education; senior classification.
Corequisites: RDNG 470; MEFB 450.

RDNG 470 Reading/Language Arts Methods in Middle Grades Education
Credits 3.2 Lecture Hours. 6 Other Hours.
Investigate current trends and issues in teaching listening, oral language, process writing, spelling, grammar and handwriting; explores relationships among the development of various language arts and the development of reading strategies and communicational competencies of middle school learners; application of best instructional practices informed by research.
Prerequisites: MEFB 352; admission to teacher education; senior classification.
Corequisites: RDNG 490; MEFB 450.

RDNG 472 Teaching Writing in Elementary and Middle Grade Classrooms
Credits 3.3 Lecture Hours.
Focuses on effective methods of writing instruction and assessment for the middle grades; reviews and reinforces sound writing practices; exposes students to theory and research in the area of writing instruction.
Prerequisite: RDNG 351.

RDNG 473 Teaching Writing Across the Grades
Credits 3.3 Lecture Hours.
Evaluates and implements effective teaching and assessment of writing for all learners; analysis of issues influencing writing instruction.
Prerequisites: RDNG 351, RDNG 361.
Corequisites: RDNG 470; MEFB 450.

RDNG 490 Assessment in Reading Instruction
Credits 3.2 Lecture Hours. 6 Other Hours.
Evaluation of middle grades students reading performance; selection, understanding, and implementation of formal and informal evaluation procedures in classroom reading assessment, diagnosis, and instruction.
Prerequisites: RDNG 352; admission to teacher education; senior classification.
Corequisites: RDNG 470; MEFB 450.

RDNG 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in reading. May be repeated 2 times for credit.
Prerequisites: Junior or senior classification and approval of instructor.

RDNG 604 Reading Diagnosis
Credits 3.2 Lecture Hours. 3 Lab Hours.
Appraisal and diagnosis of reading problems; practicum in administration and interpretation of individual reading inventories.
Prerequisite: RDNG 649 or RDNG 674 recommended.

RDNG 610 Elementary Literacy Instruction for Facilitating STEM Learning
Credits 3.3 Lecture Hours.
Evidenced based instruction of literacy skills and strategies facilitating student learning of STEM content and processes; traditional literacy and new literacies.
Prerequisite: Graduate classification.

RDNG 612 Children’s Literature and Literacy
Credits 3.3 Lecture Hours.
Children’s Literature and Literacy. Critical selection and evaluation of various children’s literature genres; comparative studies of children’s literature; development, implementation and evaluation of research in children’s literature and literacy; integration of reading and response theory into the study of literature.
Prerequisite: Graduate classification.

RDNG 613 Multicultural Children’s Literature and Literacy
Credits 3.3 Lecture Hours.
Multicultural Children’s Literature and Literacy. Analysis and evaluation of Native American, Black and Hispanic children’s literature; development, implementation and evaluation of research in multicultural literature and literacy; analysis of issues influencing multicultural literature and literacy.
Prerequisites: RDNG 612; graduate classification.
RDNG 614 Reading Research and Trends  
Credits 3. 3 Lecture Hours.  
Exploration of recent research in reading; identification of trends and patterns in issues attached, research designs employed and consistent findings; generation of new research hypotheses and guidelines for improving current practice.  
Prerequisites: Doctoral classification or approval of instructor.

RDNG 615 Theories of the Reading Process  
Credits 3. 3 Lecture Hours.  
Seminar for doctoral students and advanced master's students to study and critique major theories of the reading process that have been influential in the fields of reading, language arts, educational psychology, and related fields.  
Prerequisite: Doctoral status or approval of instructor.

RDNG 616 Organization and Supervision of Reading Programs  
Credits 3. 3 Lecture Hours.  
Organization of school reading programs; role of reading supervisor in program implementation, staff development, program evaluation.  
Coordination of reading services with total curriculum.  
Prerequisites: Doctoral classification; approval of instructor.

RDNG 620 Literacy and Language  
Credits 3. 3 Lecture Hours.  
Orthography of different languages and its relation to literacy acquisition and failure to acquire basic literacy skills. This is a seminar course in reading, language arts, bilingual education, psychology, linguistics, and related fields.  
Prerequisite: Graduate classification.

RDNG 630 Writing: Development, Assessment and Instruction  
Credits 3. 3 Lecture Hours.  
Examines the nature of writing development and how to assess both formally and informally; includes successful instructional techniques based on empirical evidence.  
Prerequisite: Graduate classification.

RDNG 642 Clinic Teaching in Reading  
Credits 3. 1 Lecture Hour. 6 Lab Hours.  
Practicum in recognition, diagnosis, remediation and corrective procedures of reading-study problems; demonstration and laboratory analysis of physiological and psychological factors related to reading disabilities.  
Prerequisite: RDNG 649 or RDNG 674.

RDNG 649 Reading Instruction in High School and College  
Credits 3. 3 Lecture Hours.  
Basic principles of reading instruction; nature and scope of total reading program; methods, materials and organization of developmental, corrective and speed-reading programs in high school and college.  

RDNG 650 Foundations of Reading Instruction  
Credits 3. 3 Lecture Hours.  
Psychological, linguistic and physical factors related to reading performance; implications for content and teaching methods; appraisal of current research and related reading for teachers, supervisors and reading specialists.  
Prerequisites: RDNG 649 and RDNG 674 or approval of instructor.

RDNG 674 Developmental Reading in the Elementary School  
Credits 3. 3 Lecture Hours.  
Methods and materials of reading instruction in the elementary grades; past, present and emerging programs; organization and administration of programs and classroom management; teaching reading to special groups; issues in reading.  

RDNG 689 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of reading. May be repeated for credit.

**RELS - Religious Studies**

**Courses**

RELS 211/HUMA 211 Hebrew Scriptures  
Credits 3. 3 Lecture Hours.  
Philosophical concepts of the Hebrew Scriptures as they relate to the development of religious and ethical ideas.  
Cross Listing: HUMA 211/RELS 211.

RELS 213/HUMA 213 New Testament  
Credits 3. 3 Lecture Hours.  
The origin and development of the religious and philosophical concepts of the New Testament.  
Cross Listing: HUMA 213/RELS 213.

RELS 220 History of Christianity: Origins to the Reformation  
Credits 3. 3 Lecture Hours.  
History of Christian doctrine, ecclesiastical organization, and religious practice, origins through Reformation, with emphasis on religion and society; life and teachings of Jesus; apostolic church; patristic period; Christianization of Roman Empire and northern Europe; monasticism; medieval church; Gregorian reform; heresy; papal monarchy; schism and conciliarism; reformations of the sixteenth century.  
Cross Listing: CLAS 220 and HIST 220.

RELS 221/HIST 221 History of Islam  
Credits 3. 3 Lecture Hours.  
Introduction to the history of Islam, from the origins of the religion to the present; development of Islamic law; gender issues; expansion of Islam to Sub-Saharan Africa and South Asia; globalized Islam.  
Cross Listing: HIST 221/RELS 221.

RELS 251/CLAS 251 Classical Mythology  
Credits 3. 3 Lecture Hours.  
Introduction to the most important myths of Greeks and Romans; ancient and modern methods of interpreting myths; the role of myths in ancient literature; readings in English.  
Cross Listing: CLAS 251/RELS 251.

RELS 289 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of religious studies. May be repeated for credit.  
Prerequisite: Approval of instructor.

RELS 302 Women and Religion  
Credits 3. 3 Lecture Hours.  
Investigation of women's position in religious institutions historically and/or currently, religion's influence on women's roles and status, and women's attempts to define their own religious perspectives; draws on sociological and philosophical insights and methods.  
Prerequisite: Junior or senior classification or approval of instructor.  
Cross Listing: SOCI 302 and WGST 302.

RELS 303 Near Eastern Religions  
Credits 3. 3 Lecture Hours.  
Beliefs and practices of Judaism, Zoroastrianism, Christianity, and Islam with particular attention to their philosophical presuppositions.  
Cross Listing: HUMA 303/RELS 303.
RELS 364/HISP 364 Diversity Lessons from Medieval Spain
Credits 3.3 Lecture Hours.
Crucible of cultures—Christian, Jewish, and Muslim—that was medieval Spain and modern implication of the experience in diversity.
Prerequisites: ENGL 104 and junior or senior classification or approval of instructor.
Cross Listing: HISP 364/RELS 364.

RELS 365/HIST 365 History of Religion in America to 1860
Credits 3.3 Lecture Hours.
Religion in America from European origins through New England Puritanism, U. S. Constitutional issues, immigration, revivalism, and the Civil War; relationship between dissenters, utopians, and visionaries versus mainstream counterparts.
Cross Listing: HIST 365/RELS 365.

RELS 366/HIST 366 History of Religion in America from 1860 to the Present
Credits 3.3 Lecture Hours.
Religion in America from the Civil War; relationship of religion and science, ethnic assimilation, emergence of fundamentalism, mass evangelism, cults and criticisms of contemporary culture; examination of social and racial problems by the major religious traditions.
Cross Listing: HIST 366/RELS 366.

RELS 371/HISP 371 Hispanic Religions
Credits 3.3 Lecture Hours.
Exploration of the history and practice of Hispanic religion, including spirit possession, evil eye, consumption of sacred substances, healing traditions, ex-votos, relics, prophecy, omens, monsters, astrology, witchcraft, the Inquisition, festivals, pilgrimage, mystics and religious contributions of diverse ethnic groups.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: HISP 371/RELS 371.

RELS 392/ENGL 392 Studies in Literature, Religion, and Culture
Credits 3.3 Lecture Hours.
Exploration of literature treating significant religious topics in the context of cultural setting; features current faculty research on such topics as Tolkien and the making of myth, C. S. Lewis, texts and cultures of the Middle East and Victorian women writers and religion.
Prerequisites: 3 credits of literature at 200-level or above; junior or senior classification.
Cross Listing: ENGL 392/RELS 392.

RELS 403/ANTH 403 Anthropology of Religion
Credits 3.3 Lecture Hours.
Anthropological theories of the relationship of religious behavior to social structure and cultural change, with particular reference to non-Western, pre-industrial societies.
Cross Listing: ANTH 403/RELS 403.

RELS 405/PSYC 405 Psychology of Religion
Credits 3.3 Lecture Hours.
Review of world's religions and the psychological study of the religious experience; religion within the context of personality; religious development through social interactions; religion in psychological research and therapy.
Prerequisites: PSYC 306 and PSYC 330 or approval of instructor.
Cross Listing: PSYC 405/RELS 405.
RELS 418 European Intellectual History from Ancient Greece to the Early Middle Ages
Credits 3. 3 Lecture Hours.
Political and social history of selected major figures and important movements in political theory, literature, sociology, art, economics and philosophy from Pre-Socratic Greece through the formative stages of the Christian Middle Ages.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: CLAS 418 and HIST 418.

RELS 419/HIST 419 European Intellectual History from the High Middle Ages to the 17th Century
Credits 3. 3 Lecture Hours.
Political and social history of selected major figures and important movements in political theory, literature, sociology, art, economics and philosophy from the founding of Scholasticism and the University System to the New Philosophy and science of 17th century.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: HIST 419/RELS 419.

RELS 464/PHIL 464 Modern Jewish Thought and Philosophy
Credits 3. 3 Lecture Hours.
An overview of modern Jewish thought and philosophy spanning Jewish European thinkers from the 18th century to the 20th century.
Prerequisite: Junior or senior classification.
Cross Listing: PHIL 464/RELS 464.

RELS 480/COMM 480 Religious Communication
Credits 3. 3 Lecture Hours.
The role of religious communication as manifested in speeches, sermons, debates, campaigns, and social movements throughout history. May be taken two times for credit.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: COMM 480/RELS 480.

RELS 485 Directed Studies
Credits 0 to 6. 0 to 6 Other Hours.
Readings and/or assigned projects for specific needs of students minoring in religious studies; directed independent or individual study in an identified area of religious studies.
Prerequisite: Approval of coordinator of religious studies.

RELS 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of religious studies. May be repeated for credit.
Prerequisite: Approval of instructor.

RENR-Renewable Natural Resources

Courses

RENR 201 Computer Applications in Agriculture
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Fundamentals of computer use and the application of agricultural software; computer use in decision making and problem solving in agriculture.
Prerequisite: MATH 102.

RENR 205 Fundamentals of Ecology
Credits 3. 3 Lecture Hours.
Principles of ecology using a holistic approach treating plants, animals and humans as one integrated whole; composition, structure, nutrient cycles and energetics of biotic communities; adaptations to environmental factors; biotic relationships; and problems of environmental quality and resource use.

RENR 215 Fundamentals of Ecology--Laboratory
Credit 1. 3 Lab Hours.
Sampling and estimating plant-animal populations, measuring environmental factors and recognizing and studying morphological, physiological and behavioral adaptations of plants and animals to biotic or abiotic influences.*

RENR 345 Park Ecology and Management
Credits 3. 1 Lecture Hour. 4 Lab Hours.
Classroom and hands-on exposure to outdoor recreation resources management in a major national park facing complex challenges; interactive problem-solving to understand natural resources, management strategies and issues related to a park's broader region; includes one intensive week in Smoky Mountains National Park. May be taken two times for credit.
Prerequisites: Junior or senior classification; or approval of instructor.

RENR 375 Conservation of Natural Resources
Credits 3. 3 Lecture Hours.
Principles and philosophies associated with the development, management and use of natural resources; ecological and social implications inherent in management alternatives involving the natural environment and use of renewable natural resources.

RENR 400 Study Abroad in Natural Resources
Credits 2 to 12. 2 to 12 Lecture Hours.
Provides students with an opportunity to gain first-hand experience in natural resource management in foreign countries; focus on the interaction of public, communal and private land tenure systems with the ecological and human dimensions of rangeland management, wildlife conservation and nature-based tourism. May be taken two times for credit.
Prerequisite: Junior or senior classification.

RENR 405 GIS for Environmental Problem Solving
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Interdisciplinary approach to train students to integrate GIS and relevant technologies for environmental problem solving; helps students relate learning to real world situations; students conceptualize, develop and manage projects using real data; one term project required.
Prerequisite: RENR 201 or equivalent or approval of instructor.

RENR 410 Ecosystem Management
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Concepts and practices relevant to the development of landscape/regional level ecosystem management plans; an ecosystem management plan will be developed utilizing a strategic management/COORDRATED resources approach to establish resource goals, ecosystem resource analysis and impact evaluation, and implementation compatible with societal and individual concerns.
Prerequisite: Senior classification or approval of instructor.*

RENR 460/RPTS 460 Nature, Values, and Protected Areas
Credits 3. 3 Lecture Hours.
Writing-intensive discussion of the ways in which protected areas reflect human values about nature; identify stakeholders in and around protected areas, exploring how interests either conflict or coincide; evaluate social, economic, cultural, and ecological trade-offs of different approaches to conservation.
Prerequisite: RPTS 307 or RPTS 316; or 9 hours of credit in natural resource courses.
Cross Listing: RPTS 460/RENR 460.*
RENR 470 Environmental Impact Assessment  
Credits 3. 3 Lecture Hours.  
The evolution of natural resources regulatory policies and how this influences current procedures for environmental/natural resources assessment and management; demonstration of the environmental impact assessment procedures and policy issues associated with environmental impacts.  
Prerequisite: Senior classification or approval of instructor.

RENR 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified field of renewable natural resources. May be repeated for credit.  
Prerequisite: Approval of instructor.*

RENR 650/ESSM 676 Leadership Development and Management of Environmental NGOs  
Credits 3. 3 Lecture Hours.  
Trends and increasing power of NGOs in environment and sustainable development; understanding of the organizational structures, functions, planning and management processes of environmental NGOs; technical skills and leadership qualities for careers with environmental NGOs.  
Prerequisite: Graduate classification.  
Cross Listing: ESSM 676/RENR 650.

RENR 659 Ecological Economics  
Credits 3. 3 Lecture Hours.  
Study of the relationships between ecosystems and economic systems; understanding the effects of human economic endeavors on ecological systems and how the ecological benefits and costs of such activities can be quantified and internalized.  
Prerequisite: Graduate classification.  
Cross Listing: AGEC 659 and ESSM 671.

RENR 660/ESSM 672 Environmental Impact Analysis for Renewable Natural Resources  
Credits 3. 3 Lecture Hours.  
Analysis and critique of contemporary environmental analysis methods in current use; environmental impact statements; national policies; political, social and legal ramifications as related to development and use of renewable natural resources.  
Cross Listing: ESSM 672/RENR 660.

RENR 662 Environmental Law and Policy  
Credits 3. 3 Lecture Hours.  
Analysis of the legal theories used to allocate and protect environmental resources; common law, federal and state statutes, and international treaties dealing with the environment; policies and laws for controlling air, water, solid waste, toxic waste and water pollution; species protection and natural resource use.

RLEM-Rangeland Ecology & Mgmt  

Courses  

RLEM 324 Application of Rangeland Management Principles  
Credits 1. 2 Lab Hours.  
An opportunity to experience and visualize rangeland management practices under field conditions and to develop a practical understanding of rangeland planning and principles in an integrated fashion.  
Prerequisite: Junior or senior classification or approval of instructor.

RLEM 401 Plant-Herbivore Dynamics  
Credits 3. 3 Lecture Hours.  
Evaluates the effects of herbivory at the plant population and community levels; developmental plant morphology and plant resistance to grazing; foraging strategies of herbivores relating to landscape/plant attributes along with animal nutritional needs; manipulation of the grazing process to meet management objectives.  
Prerequisite: ESSM 314.*

RPTS - Rec, Park & Tourism Sci  

Courses  

RPTS 201 Foundations of Recreation, Parks and Tourism  
Credits 3. 3 Lecture Hours.  
(PLHD 1336) Foundations of Recreation, Parks and Tourism. Analysis of the elements comprising a community, community assessment techniques and community development processes engaged by stakeholders and residents to improve living conditions; definitions and principles associated with community development.

RPTS 209 Park and Tourism Operations  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Planning, execution and supervision of field maintenance and operations.

RPTS 291 Research  
Credits 1 to 3. 1 to 3 Other Hours.  
Research conducted under the direction of faculty member in recreation park and tourism sciences.  
Prerequisites: Freshman or sophomore classification and approval of instructor.

RPTS 300 Supervised Field Studies  
Credits 3. 3 Other Hours.  
Survey and application of principles of recreation and parks; selected aspects of park and recreation management in an operational setting under the supervision of an approved agency; preparation and presentation of a comprehensive analysis of a specific problem; offered on an individual basis. May be repeated for credit.  
Prerequisites: RPTS 307; 12 hours of credit in recreation and parks.

RPTS 301 Leisure and Outdoor Recreation in American Culture  
Credits 3. 3 Lecture Hours.  
Introduction to the fundamental concepts of leisure and outdoor recreation and how they influence us as individuals, groups and society; critical factors such as self, family, lifespan, ecology, health, work patterns, communications, diversity, popular culture, and consumption are studied in relationship to past, present and future leisure patterns.

RPTS 302 Application of Tourism Principles  
Credits 3. 3 Lecture Hours.  
Tourism principles applied at local, regional and international levels; examination of the scale, scope and organization of the industry including marketing destinations and experiences; issues related to the economic, technological and political aspects of tourism.  
Prerequisite: Junior or senior classification.
RPTS 304 Administration of Recreation Resource Agencies
Credits 3. 3 Lecture Hours.
Contemporary issues and related administrative practices associated with the provision of recreation services and settings; addresses principles associated with recreation resource agency administration; personnel and customer-related administrative issues in recreation resource agencies; concepts and principles relevant to commercial and non-profit recreation resource agencies.
Prerequisites: RPTS 201 and RPTS 209; RENR 201.

RPTS 307 Methods of Environmental Interpretation
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Communication processes and practices between resource managers and publics using or affected by natural, cultural and tourism resource places; principles and techniques of gathering, analyzing and disseminating information through various media, such as exhibits, presentations, publications and programs.*

RPTS 308 Foundations of Community and Community Development
Credits 3. 3 Lecture Hours.
Analysis of the elements comprising a community, community assessment techniques and community development processes engaged by stakeholders and residents to improve living conditions; definitions and principles associated with community development.
Prerequisite: Junior or senior classification.

RPTS 311 Planning and Implementation of Events and Programs
Credits 3. 3 Lecture Hours.
Planning, operations, administration and evaluation; includes creation and implementation of programs and special events with budgeting, operational and venue logistics, marketing, fund raising, hospitality training and participant satisfaction.
Prerequisite: Junior or senior classification.*

RPTS 316 Recreational Management of Wildlands
Credits 3. 3 Lecture Hours.
Management and recreational use of wild and wilderness areas and multiple use management areas; systems and techniques for dealing with management problems in outdoor recreation.
Prerequisite: Junior or senior classification.*

RPTS 320 Event Management and Operations I
Credits 3. 3 Lecture Hours.
Principles and applications for effective planning and management of events; planning, promotion, operational logistics, sponsorship and evaluation.
Prerequisite: RPTS 311.

RPTS 321 Event Management and Operations II
Credits 3. 3 Lecture Hours.
Advanced principles and applications of event management, including practical knowledge relating to contracting, media, fund raising, compliance and oversight, risk management, site logistics, sponsorships and vendor management.
Prerequisites: RPTS 311 and RPTS 320.

RPTS 331 Tourism Marketing
Credits 3. 3 Lecture Hours.
Application of basic tourism marketing principles and concepts in government, business, and social-cause contexts; situation analysis and operational evaluation; decision making in terms of product, place, price, and channel of distribution mixes for tourism attractions and services.
Prerequisite: RPTS 302 and junior or senior classification.

RPTS 336 Research and Analysis in Recreation and Tourism
Credits 3. 3 Lecture Hours.
Examination of current tourism and recreation research emphasizing specialized research methodology, adaptive techniques and methods of research useful to the recreation and tourism professional; analysis of the methods of problems identification, formulation and solution.
Prerequisites: RENR 201 and STAT 201 or equivalents; all mathematics requirements satisfied.*

RPTS 340 Recreation, Parks, Tourism and Diverse Populations
Credits 3. 3 Lecture Hours.
Review of major judicial decisions and civil rights laws on provision and distribution of leisure services in society; influence of age, disability, ethnicity, national origin, race, religion and gender on individual’s preferences for particular experiences; implications of individual differences for the provision of services.
Prerequisite: Junior or senior classification.*

RPTS 360 Ecotourism: Principles and Practices
Credits 3. 3 Lecture Hours.
Principles and practices related to ecotourism; analyzes outcomes of ecotourism for conservation and development; ecotourism as a strategy to protect culture and the physical environment.
Prerequisite: RPTS 302.

RPTS 370 Youth Development Organizations and Services
Credits 3. 3 Lecture Hours.
Changing views of adolescence and youth culture in the United States; developmental assets and principles of developing positive youth development supports, opportunities and services; mentoring and staff development for youth serving agencies; goals, program emphases, administrative methods and membership of major youth serving organizations.

RPTS 371 Understanding and Developing Effective Skills for Youth Development
Credits 3. 3 Lecture Hours.
Development of skills needed to effectively work with youth; issues such as youth participation, conflict resolution, youth-adult collaboration, leadership development, youth empowerment and youth voice; connection of theoretical concepts to practice.
Prerequisites: RPTS 370 and junior or senior classification.

RPTS 401 Tourism and Recreation Enterprises
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Market and financial feasibility analysis; resource characteristics, location and market aspects of tourism and recreation enterprises; sources of funding for facility development; approaches to marketing recreation, park and tourism services; applying knowledge to case study situations.
Prerequisites: RPTS 304 or RPTS 423 and senior classification.*

RPTS 402 Park Planning and Design
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Classification of areas according to primary function, location and clientele served; basic park planning principles involving scale, circulation, function and spatial relationships; methodology for establishing planning goals, objectives and planning strategies.
Prerequisites: Junior or senior classification.*

RPTS 403 Financing and Marketing Recreation, Park and Tourism Resources
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Public sources of funding for facility development and of approaches to marketing recreation, park, and tourism services; applying knowledge to case study situations.
Prerequisites: RPTS 304 or RPTS 423; senior classification.
RPTS 404/SOCI 404 Sociology of the Community
Credits 3.3 Lecture Hours.
Organization of American communities examining the bases of community, types of communities and the changes faced by communities.
Prerequisite: SOCI 205; Junior or senior classification.
Cross Listing: SOCI 404/RPTS 404.

RPTS 408 Community Development and Supporting Institutions
Credits 3.3 Lecture Hours.
Scope, function and mission of domestic and international organizations that support community development efforts.
Prerequisites: RPTS 308 or approval of instructor; junior or senior classification.

RPTS 411 Cruise Tourism
Credits 3.3 Lecture Hours.
Overview of cruise tourism; management of service sectors; understanding of cultural aspects of places traveled; cruise marketing/decision making; geography of cruising; youth programming; agri-tourism; identification of issues related to the economic, technological and political aspects of cruise tourism.
Prerequisite: Junior or senior classification.

RPTS 421 Planning and Implementation of Events in Resorts and Hotels
Credits 3.3 Lecture Hours.
Principles and applications for effective planning and management of events in resorts and hotels; planning, promotion, operational logistics, sponsorship and evaluation.
Prerequisite: Junior or senior classification.

RPTS 423 Tourism Management
Credits 3.3 Lecture Hours.
Management issues and tools related to the travel and tourism industry; history, planning, operations, leading, directing and controlling tourism businesses; complexity and scope of tourism systems; issues related to ethics and sustainability; managing tourism in different environments; roles of technology and information technology; future of tourism.
Prerequisite: RPTS 302.*

RPTS 426 Tourism Impacts
Credits 3.3 Lecture Hours.
Consequences and impacts of various kinds of tourism development for host communities and regions; read and evaluate case studies from Texas, other areas in the United States and internationally; economic, environmental, social, cultural and political impacts associated with tourism proposals, project development, tourist activity, industry expansion and industry decline.
Prerequisite: RPTS 302.

RPTS 441 Tourism Experience
Credits 3.3 Lecture Hours.
Theoretical foundation of tourism experiences from an interdisciplinary perspective, including the role of humans, nature/landscapes, built environments and technologies in staging tourism-experiences; draws implications for the design/planning, management and marketing of tourism venues such as events, festivals, museums, hotels/resorts, cruise ships, cities, theme parks, and websites.
Prerequisite: Junior or senior classification or approval of instructor.*

RPTS 444 Service Quality for Hospitality Organizations
Credits 3.3 Lecture Hours.
Application of SERVQUAL concepts with focus on implementing measures to enhance customer service; in-depth study of planning and administering hospitality service strategies, measurement of service delivery, repair and recovery of service delivery gaps, and management and training of employees; practical applications of research in the field.
Prerequisite: Junior or senior classification.

RPTS 445 Sustainability in International Tourism
Credits 3.3 Lecture Hours.
International tourism with a focus on the diversity of tourism practices and policies around the world and approaches scholars use to study tourism planning, management, marketing, sustainability and impacts; includes a required international field trip during spring break.
Prerequisite: Junior or senior classification or approval of instructor.*

RPTS 446 Information Technology Adoption and Use in Recreation, Park and Tourism Organizations
Credits 3.3 Lecture Hours.
Theories of technology adoption and diffusion in recreation, park and tourism organizations; use of technology for knowledge management, benchmarking, and collaboration within leisure and tourism organizations.
Prerequisite: RENR 201.

RPTS 454 Amazon Field School
Credits 4.4 Lecture Hours.
Investigation of social and ecological complexities of biodiversity conservation in tropical ecosystems; biological and social science approaches to evaluate causes, consequences and solutions to biodiversity loss through ecology, culture and governance.
Prerequisite: Junior or senior classification with a minimum GPA of 2.0 and approval of instructor.
Cross Listing: VTPB 404 and WFSC 454.

RPTS 460/RENR 460 Nature, Values, and Protected Areas
Credits 3.3 Lecture Hours.
Writing-intensive discussion of the ways in which protected areas reflect human values about nature; identify stakeholders in and around protected areas, exploring how interests either conflict or coincide; evaluate social, economic, cultural, and ecological trade-offs of different approaches to conservation.
Prerequisite: RPTS 307 or RPTS 316; or 9 hours of credit in natural resource courses.
Cross Listing: RENR 460/RPTS 460.*

RPTS 474 Management of Programs and Services for Youth
Credits 4.3 Lecture Hours. 2 Lab Hours.
Organizational behavior, administration and management of public, non-profit and commercial youth programs and agencies; strategic planning, marketing, financial resource development, budgeting and fiscal management; contemporary issues facing youth development field; international perspective on youth agencies.
Prerequisite: RPTS 304, RPTS 370 and RPTS 371.

RPTS 476 Leadership for Outdoor Recreation
Credits 3.3 Lecture Hours.
Leadership principles related to outdoor recreation; classroom instruction and experiential learning; skills training through field trips; risk management planning, environmental education, group facilitation, and trip planning.
Prerequisite: RPTS 370.
RPTS 478 Youth Development Practice
Credits 3. 3 Lecture Hours.
Application of youth development philosophy in community settings; principles and practices of community youth development and existing youth development models; local efforts related to community youth development.
Prerequisite: RPTS 370, RPTS 371 and junior or senior classification.

RPTS 481 Seminar
Credit 1. 1 Lecture Hour.
Development of knowledge and skills necessary for employment in the recreation, park and tourism fields; focus on career preparation and job search strategies, professionalism, networking and opportunities for advanced education.
Prerequisite: Junior or senior classification.

RPTS 484 Internship
Credits 1 to 6. 1 to 6 Other Hours.
Practical experience working in a professional recreation, park or tourism setting. Offered on an individual basis. May be repeated for credit.
Prerequisite: Approval of department head.

RPTS 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
For individual research by advanced undergraduates upon a broad range of subjects not included in established courses.
Prerequisite: Junior classification or approval of department head.

RPTS 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 9 Lab Hours.
Selected topics in an identified field of recreation and parks. May be repeated for credit.*

RPTS 491 Research
Credits 1 to 3. 1 to 3 Other Hours.
Research conducted under the direction of faculty member in recreation park and tourism sciences. Registration in multiple sections of this course are possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor.

RPTS 601 Interrelationships of Recreation and Leisure Concepts
Credits 3. 3 Lecture Hours.
History and philosophy of the field of recreation and parks; fundamentals of planning, development and management of resources allocated for recreation, parks and tourism purposes; development of the recreation movement with broad treatment of the role of recreation and parks in contemporary society.

RPTS 602 Social Science Foundations of Recreation, Parks and Tourism
Credits 3. 3 Lecture Hours.
Sociological and social psychological dimensions of leisure, recreation and related behavior; nature and function of leisure for individuals and for society; implications for development and management of recreation resources.
Prerequisite: RPTS 601 or previous academic background in recreation and parks.

RPTS 603 Financing and Marketing Park and Recreation Resources
Credits 3. 3 Lecture Hours.
Positioning park and recreation services; traditional and non-traditional sources of financing for developing services and facilities; philosophy and techniques of marketing services and facilities.

RPTS 604 Principles of Community and Community Development
Credits 3. 3 Lecture Hours.
Examines different theories about community development as well as the concept of community; explores measurement and other methodological issues in the conduct of basic and applied community research.
Prerequisite: Graduate classification.

RPTS 605 Community Organization
Credits 3. 3 Lecture Hours.
Examines how community organization and institutions differ and result from diverse social, cultural and demographic factors; explores how these factors restructure communities over time and community responses to restructuring.
Prerequisite: Graduate classification.

RPTS 606 Overview of Tourism
Credits 3. 3 Lecture Hours.
Theoretical introduction to the field of tourism sciences; the cooperative and dynamic nature of decision-making in tourism; the contributions made by various disciplines towards understanding the consequences of tourism trade and activity; and identification of critical issues in the study of travel and tourism.

RPTS 609 Social, Economic and Cultural Issues in Outdoor Recreation and Natural Resources
Credits 3. 3 Lecture Hours.
Survey of socio-economic and cultural characteristics impinging on provision of outdoor recreation opportunities in urban and non-urban settings; implications of social and cultural factors on recreation resource use patterns, resource development and policy issues.

RPTS 615 Analytic Techniques in Recreation, Parks and Tourism
Credits 3. 3 Lecture Hours.
Analysis of current research; instruments and analytic techniques used in the selection and formulation of research problems.

RPTS 616 Tourism Economics
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Introduction to tourism economics including: tourism consumption and demand analysis; operating and capital budgeting; measurement of economic impacts through input/output analysis; forecasting; project management through PERT/CPM; decision making under uncertainty; benefit/cost analysis.
Prerequisites: RPTS 606 and STAT 651 or approval of instructor.

RPTS 620 Interdisciplinary Seminar in Prevention Science
Credit 1. 1 Lecture Hour.
Contemporary research programs that represent the interdisciplinary field of prevention science; strengths and limitations of diverse theoretical and conceptual bases of research in prevention science; application of research findings to issues related to the prevention of mental, emotional, and physical health problems and the promotion of well-being. May be taken 3 times for credit.
Prerequisite: Graduate standing and either admission to the interdisciplinary graduate certificate in prevention science program or approval of instructor.
Cross Listing: COMM 671, HLTH 671 and SPSY 620.
RPTS 626 Social Impacts of Tourism
Credits 3.3 Lecture Hours.
Analysis of social, cultural and political impacts associated with travel behavior and tourism development, emphasizing a case study approach; theories and methods for assessing individual, community and organization impacts at local and regional levels; host/guest interactions; evaluation of processes of tourism planning and decision-making; and qualitative and quantitative measures for assessing social impacts.
Prerequisite: RPTS 606 or approval of instructor.

RPTS 636 Philosophy of Social Research
Credits 3.3 Lecture Hours.
Overview of the history and development of the philosophy of social science; Relationships science; issues in social research; Sociology of Knowledge; related debates in various disciplines and fields of study. May be taken 3 times for credit.
Prerequisite: Doctoral classification.

RPTS 641 Tourism Experience
Credits 3.3 Lecture Hours.
Discusses the theoretical foundations of tourism experiences from an interdisciplinary perspective, including the role of humans, nature/landscapes, built environments and technologies in staging tourism-experiences; draws implications for the design/planning, management and marketing of tourism venues such as events, festivals, museums, hotels/resorts, cruise ships, cities, theme parks as well as websites.

RPTS 646 Heritage Tourism
Credits 3.3 Lecture Hours.
Comprises a transdisciplinary examination of contemporary research and practice in heritage tourism and public culture; encourages to deploy a variety of disciplinary outlooks to explore the representation of peoples, places and pasts in a range of settings from the indigenous/sacred to the post industrial/post colonial.

RPTS 654 AMAZON FIELD SCHOOL
Credits 4.4 Lecture Hours.
Investigation of social and ecological complexities of biodiversity conservation in tropical ecosystems; biological and social science approaches to evaluate causes, consequences and solutions to biodiversity loss through ecology, culture and governance.
Cross Listing: VTMI 604 and WFSC 654.

RPTS 655/WFSC 655 Applied Biodiversity Science I
Credits 3.3 Lecture Hours.
Students will study in the areas of Conservation genetics, metapopulations, landscape ecology, and ecosystem management.
Prerequisite(s): Graduate classification.
Cross Listing: WFSC 655/RPTS 655.

RPTS 666 Parks, Tourism and the Natural Environment
Credits 3.3 Lecture Hours.
Parks, Tourism and the Natural and Cultural Environment. Analysis of natural and cultural resource management in the United States; emphasis on federal policy and the influence by political processes at the national, regional, and local levels; case studies to illustrate conceptual and legal frameworks in real world contexts, including the policy and politics of tourism and recreation, endangered species, contested history, and Native American traditions and sovereignty.
Prerequisite: RPTS 602 or approval of instructor.

RPTS 670 Youth Development Programs and Services
Credits 3.3 Lecture Hours.
Principles and practices of youth development supports, opportunities, programs and services; emphasis on the role of out-of-school time settings in youth development; programming considerations related to gender, disability and culture; introduction to evaluation and financing of youth development programs.

RPTS 678 Latent Variable Model Applications in the Leisure Sciences
Credits 3.3 Lecture Hours.
Introduction to structural equation modeling (SEM); background on conceptual issues, application of the method, and insight on SEM software; measurement theory, missing data analysis, non-normal data; confirmatory factor analysis, path analysis, multi-group models.
Prerequisites: STAT 636 or approval of instructor.

RPTS 684 Professional Internship
Credits 1 to 4.1 to 4 Other Hours.
Survey and application of principles of recreation and resources development; selected aspects of park and recreation management in professional setting within an approved recreation/park agency under the supervision of a member of the graduate faculty.

RPTS 685 Directed Studies
Credits 1 to 4.1 to 4 Other Hours.
Investigations not included in student's research for thesis or dissertation; problems selected in administration or management, recreation or planning.

RPTS 689 Special Topics in...
Credits 1 to 4.1 to 4 Lecture Hours. 0 to 9 Lab Hours.
Selected topics in an identified area of recreation and resources development. May be repeated for credit.
Prerequisite: Approval of department head.

RPTS 691 Research
Credits 1 to 23.1 to 23 Other Hours.
Research in recreation and resources development for thesis or dissertation.

RPTS 693 Professional Study
Credits 1 to 9.1 to 9 Other Hours.
Approved research or professional paper undertaken as the terminal requirement for the Master of Science Non-Thesis or Natural Resources Development. May be taken more than once, but not to exceed 3 hours credit towards a degree.
Prerequisite: Approval of instructor.

RUSS - Russian

Courses

RUSS 101 Beginning Russian I
Credits 4.3 Lecture Hours. 2 Lab Hours.
(RUSS 1411, 1511) Beginning Russian I. Elementary language study with oral, written and reading practice. Attention given to background for conversation. Part of class preparation will be done in language laboratory.

RUSS 102 Beginning Russian II
Credits 4.3 Lecture Hours. 2 Lab Hours.
(RUSS 1412, 1512) Beginning Russian II. Continuation of RUSS 101. Part of class preparation will be done in language laboratory.
Prerequisite: RUSS 101.
RUSS 201 Intermediate Russian I
Credits 3. 3 Lecture Hours.
(RUSS 2311) Intermediate Russian I. Continuation and review of
grammar, selected readings; material to develop conversational and
reading ability.
Prerequisite: RUSS 102.

RUSS 202 Intermediate Russian II
Credits 3. 3 Lecture Hours.
(RUSS 2312) Intermediate Russian II. Continuation of RUSS 201.
Readings taken from standard works.
Prerequisite: RUSS 201.

RUSS 211 Russian Conversation
Credits 3. 3 Lecture Hours.
Development of conversational skills in Russian; building of active
vocabulary; exercises with emphasis on correct diction; oral presentations;
skits; dialogues; discussion of current events; conducted in Russian.
Prerequisite: RUSS 102 or equivalent.

RUSS 221 Field Studies I
Credits 3. 3 Lecture Hours.
Russian language and culture, taught in the former Soviet Union;
supervised travel of cultural interest; participation in courses and activities
at a Russian university or institute; exams, written and oral reports; to be
taken concurrently with RUSS 222.
Prerequisite: RUSS 102 with a grade of B or higher.

RUSS 222 Field Studies II
Credits 3. 3 Lecture Hours.
Russian language and literature taught in the former Soviet Union in
cooperation with a Russian university or institute; exams, written and oral
reports; to be taken concurrently with RUSS 221.
Prerequisite: RUSS 102 with a grade of B or higher.

RUSS 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Individual supervision of readings or assigned projects in Russian,
selected for each student individually.
Prerequisite: Approval of instructor and department head.

RUSS 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of Russian. May be repeated for
credit.
Prerequisite: Approval of instructor.

RUSS 301 Advanced Grammar and Composition I
Credits 3. 3 Lecture Hours.
Review of grammar at an advanced level; readings of literary texts for
analysis and emulation; development of oral and written skills; required for
modern languages majors in Russian; conducted in Russian.
Prerequisite: RUSS 202 or RUSS 222 or registration therein.

RUSS 302 Advanced Grammar and Composition II
Credits 3. 3 Lecture Hours.
Continuation of RUSS 301; literary interpretation of longer works;
particular emphasis on the short stories of Chekhov and other major
authors; required for modern languages majors in Russian; conducted in
Russian.
Prerequisite: RUSS 202 or RUSS 222 or registration therein.

RUSS 322 Masterpieces of Russian Literature
Credits 3. 3 Lecture Hours.
Selected works of Russian literature, representative of its major authors
and most important literary movements; literary analysis and evaluation of
each work's cultural background; conducted in Russian.
Prerequisite: RUSS 202 or RUSS 222 or registration therein. May be
retaken with approval of department head.

RUSS 410 Seminar in Russian Studies
Credits 3. 3 Lecture Hours.
Exploration of a significant topic, event, or period in Russian literature and
culture; taught in Russian.
Prerequisite: RUSS 202 or RUSS 222.

RUSS 441/EURO 441 The Russian Novel I: Tolstoy and Dostoevsky
Credits 3. 3 Lecture Hours.
Study of the major works of Tolstoy and Dostoevsky; discussion of the
literary nature and purpose of novels, especially in the context of Russian
culture; taught in English.
Prerequisite: RUSS 201 or registration therein, or approval of instructor.
Cross Listing: EURO 441/RUSS 441.

RUSS 442/EURO 442 The Russian Novel II: The Twentieth Century
Credits 3. 3 Lecture Hours.
Study of major Russian novels from ca. 1900 to the end of Stalinism;
exploration of topics relevant to Russia's experience in the 20th century;
taught in English.
Prerequisite: RUSS 201 or registration therein, or approval of instructor.
Cross Listing: EURO 442/RUSS 442.

RUSS 443/EURO 443 Contemporary Russian Prose
Credits 3. 3 Lecture Hours.
Study of Russian and Soviet 20th century prose literature, with emphasis
on post-Stalinist and post-glasnost writers; taught in English.
Prerequisite: RUSS 201 or registration therein, or approval of instructor.
Cross Listing: EURO 443/RUSS 443.

RUSS 444/EURO 444 Russian Drama
Credits 3. 3 Lecture Hours.
Introduction to the masterpieces of Russian drama from the 19th century
to the present; includes such authors as Pushkin, Chekhov, Gorky,
Arbuzov, Rozov and Petrushevskaya; taught in English.
Prerequisite: RUSS 201 or registration therein, or approval of instructor.
Cross Listing: EURO 444/RUSS 444.

RUSS 446/EURO 446 Russian Artistic Culture I: Beginnings to 1900
Credits 3. 3 Lecture Hours.
Masterpieces of Russian art, including architecture, dance, theater, music,
and literature, from its beginnings until ca. 1900; taught in English.
Prerequisite: RUSS 201 or registration therein, or approval of instructor.
Cross Listing: EURO 446/RUSS 446.

RUSS 447/EURO 447 Russian Artistic Culture II: 1890 to Present
Credits 3. 3 Lecture Hours.
Masterpieces of Russian art, including architecture, dance, theater, music,
film, and literature, from ca. 1890 to the present; taught in English.
Prerequisite: RUSS 201 or registration therein, or approval of instructor.
Cross Listing: EURO 447/RUSS 447.

RUSS 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Individual supervision of readings or assigned projects, selected for each
student individually; written and oral reports.
Prerequisite: Approval of instructor and department head.
RUSS 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of Russian language, literature and civilization.
Prerequisite: Approval of instructor.

RUSS 491 Research
Credits 1 to 3. 1 to 3 Other Hours.
Research conducted under the direction of faculty member in Russian.
May be taken three times for credit.
Prerequisites: Junior or senior classification and approval of department head.

RUSS 692 Readings
Credits 3. 3 Lecture Hours.
Readings in Russian literary texts in the original language.
Prerequisite: Graduate classification.

SCEN - College of Science

Courses

SCEN 201 Self-Directed Experiences with Adolescents
Credit 1. 1 Lecture Hour. 3 Lab Hours.
Study of adolescents in diverse school and community settings; issues in physical, mental, social and emotional development; issues related to racism, sexism, and cultural diversity; development, presentation, and defense of portfolio required. Attendance at all seminars and scheduled observations required.
Prerequisite: Major in mathematics, biology, chemistry or physics, or approval of instructor.

SCEN 289 Special Topics in...
Credits 1 to 3. 1 to 3 Lecture Hours. 0 to 3 Lab Hours.
Special Topics in... Selected topics in an identified area of science. May be repeated for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

SCEN 292 Cooperative Education in Science
Credits 2. 20 Other Hours.
Educational work assignment by a student in the field of his or her career interest and course of study. Supervision of the student will be by the cooperating employer and the instructor. A technical report, approved by the instructor, on a related subject area will be required.
Prerequisite: Approval of the college coordinator of cooperative education.

SCEN 301 College of Science Study Abroad
Credits 0 to 18. 0 to 18 Other Hours.
For student in approved programs abroad. May be repeated for credit.
Prerequisites: Admission to approved program and approval of academic dean.

SCEN 392 Cooperative Education in Science
Credits 2. 20 Other Hours.
Educational work assignment by a student in the field of his or her career interest and course of study. Supervision of the student will be by the cooperating employer and the instructor. A technical report, approved by the instructor, on a related subject area will be required.
Prerequisite: Approval of the college coordinator of cooperative education.

SCEN 489 Special Topics in...
Credits 1 to 4. 0 to 4 Lecture Hours. 0 to 8 Lab Hours.
Special Topics in... Selected topics in an identified area of science. May be repeated for credit.
Prerequisites: Junior or senior classification and approval of instructor.

SCEN 492 Cooperative Education in Science
Credits 2. 20 Other Hours.
Educational work assignment by a student in the field of his or her career interest and course of study. Supervision of the student will be by the cooperating employer and the instructor. A technical report, approved by the instructor, on a related subject area will be required.
Prerequisite: Approval of the college coordinator of cooperative education.

SCEN 600 Science Graduate Study Abroad
Credits 1 to 18. 1 to 18 Other Hours.
Approved study abroad student participation; reciprocal educational exchange programs. May be taken two times for credit.
Prerequisite: Admission to approved program.

SCEN 677 Science, Technology, Engineering and Mathematics (STEM) Teaching Professional Development
Credit 1. 1 Lecture Hour.
Center for Teaching Excellence (CTE) consultation and faculty mentoring in STEM teaching; course topic and syllabus design; learning outcomes and assessment; teaching methodology; reflection on teaching philosophy; reflection on teaching as research. Must be taken on satisfactory/unsatisfactory basis.
Prerequisites: Graduate classification and approval of instructor.
Cross Listing: GEOS 677 and ENGR 677.

SCEN 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of science. May be repeated for credit.
Prerequisites: Graduate classification and approval of instructor.

SCEN 698 Writing for Publication
Credits 3. 3 Lecture Hours.
Writing in academic disciplines and settings. Writing for different audiences and purposes. Style; planning and development of journal articles; grant proposals; correspondence; oral presentations; technical reports. Permission of departmental/college graduate advisor.
Prerequisite: Advanced standing in master's/doctoral programs.

SCMT - Supply Chain Mgmt

Courses

SCMT 300/ISYS 300 Business Communications I
Credit 1. 1 Lecture Hour.
Proper techniques for writing major-specific business communications; progress report, memorandum, letter, executive summary; verbal communications via phone call and person-to-person communications; critiques of personal and peer writing.
Prerequisites: Junior or senior classification; SCMT majors only.
Cross Listing: ISYS 300/SCMT 300.

SCMT 303 Statistical Methods
Credits 3. 3 Lecture Hours.
Collection, tabulation and presentation of numerical data; sampling, estimation of averages and variation, probability and error, hypothesis testing and correlation.
Prerequisite: Admission to upper division in Mays Business School.
SCMT 305 Intermediate Business Statistics
Credits 3.3 Lecture Hours.
Selected topics in statistical analysis; practical applications to functional problems in accounting, finance, marketing and management; applications of existing computer programs minimize computations.
Prerequisite: SCMT 303 or STAT 301, STAT 302, or STAT 303.

SCMT 309 Supply Chain Management Principles
Credits 3.3 Lecture Hours.
Integrated management of the make, buy and delivery processes in firms; emphasis on issues specific to the procurement, manufacturing, and logistics disciplines; requirements for operating in a global marketplace; includes cultural, functional and strategic aspects of global business.
Prerequisite: ISYS 209; junior classification; University Studies Business Concentration students only.

SCMT 335 Sourcing and Procurement
Credits 3.3 Lecture Hours.
Processes to identify and manage suppliers for goods and services to support operations; including sourcing, contracting, negotiations, buying procedures, cost and price analysis, vendor relations, auditing and inspection, supplier relations, and applications to information technology systems.
Prerequisite: SCMT 364 with a grade of C or better; SCMT 340 and SCMT 361; or approval of instructor.

SCMT 336 Decision Support Systems
Credits 3.3 Lecture Hours.
Application of quantitative decision-making techniques to management decision problems; focus on model development, solution and implementation of results.
Prerequisites: SCMT 364; junior or senior classification.

SCMT 340 Supply Chain Management
Credits 3.3 Lecture Hours.
Focus on the integrated management of the total product delivery system; purchasing, inventory management and distribution functions, with emphasis on materials and information flows.
Prerequisite: SCMT 364 with a grade of C or better.

SCMT 345 Business Process Design
Credits 3.3 Lecture Hours.
Design, implementation and improvement of the processes by which a firm sources, makes, and delivers products and services to meet customer requirements; includes six-sigma, process flow charting, computer simulation, and other techniques to document, analyze, design and improve business processes.
Prerequisite: SCMT 364 with a grade of C or better; SCMT 340 and SCMT 361; or approval of instructor.

SCMT 361 Operations Planning and Control
Credits 3.3 Lecture Hours.
Planning and controlling the conversion of materials, labor, capital, and information into goods and services for both manufacturing and service organizations; emphasis on managerial and technical aspects of planning and controlling operating systems.
Prerequisite: SCMT 364 with a grade of C or better; or approval of instructor.

SCMT 364 Operations Management
Credits 3.3 Lecture Hours.
Concepts, issues and techniques used to plan, analyze, and control systems of production; operational problems in producing goods and services.
Prerequisite: SCMT 303 or STAT 301, STAT 302, or STAT 303 or concurrent enrollment; admission to upper division in Mays Business School.

SCMT 375 Supply Chain Security
Credits 3.3 Lecture Hours.
Security of global supply chains; selection of appropriate technologies utilized in securing global supply chains; planning responses to disaster events in relation to the delivery and receipt of goods and services; designing draft security policies for an organization’s supply chain.
Prerequisite: SCMT 364.

SCMT 380 Lean Business Systems
Credits 3.3 Lecture Hours.
Analysis of real world business challenges using an operational framework to identify and solve problems; provides a route map to sustain results; exploration of lean strategies such as root cause analysis, batch to pull processes, value stream mapping, level loading, line balancing.
Prerequisite: Admission to upper division in Mays Business School.

SCMT 400/ISYS 400 Business Communication II
Credit 1.1 Lecture Hour.
Development of critical interpersonal and oral communication skills; strategies for positive team development; conflict resolution; oral presentations and information elicitation; production of effective visual aids.
Prerequisites: Junior or senior classification; SCMT majors only.
Cross Listing: ISYS 400/SCMT 400.

SCMT 464 Advanced Supply Chain Management
Credits 3.3 Lecture Hours.
Advanced contemporary topics in supply chain and operations management; developing analytical insights into the operation of selected methodologies.
Prerequisites: SCMT 340 and senior classification.

SCMT 465 Information Technology for Supply Chain Management
Credits 3.3 Lecture Hours.
Overview of information technology applications for planning and controlling the design, manufacture and distribution of goods and services; managerial and technical aspects of information technology for product design, shop floor, factory, enterprise and supply chain management.
Prerequisite: SCMT 340 with a grade of C or better; SCMT 361; or approval of instructor.

SCMT 466 Enterprise Resource Planning
Credits 3.3 Lecture Hours.
Application of advanced information technology for integrating business functions through distributed databases; applications for planning, scheduling, purchasing and costing to multiple layers of the organization.
Prerequisite: SCMT 364.

SCMT 484 Supply Chain Management Internship
Credits 1 to 4.1 to 4 Other Hours.
A directed internship in an organization to provide students with a learning experience supervised by professionals in organizational settings appropriate to the student’s professional objectives. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisite: SCMT major and approval of academic advisor and instructor.
SCMT 485 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed study of selected problems in an area of supply chain management not covered in other courses.
Prerequisites: Admission to upper division in Mays Business School and approval of academic advisor and instructor.

SCMT 489 Special Topics In...
Credits 1 to 4. 1 to 4 Other Hours.
Selected topic in an identified field of supply chain management two times for credit.
Prerequisites: Admission to upper division in Mays Business School and approval of academic advisor and instructor.

SCMT 610 Quantitative Analysis for Business Decisions
Credits 1 to 3. 1 to 3 Lecture Hours.
Formulation and structuring of business problems using selected quantitative techniques; modeling and statistical analysis stress computer applications. May be repeated for up to 3 hours credit. Classification 6 students may not enroll in this course.
Prerequisite: SCMT 610 or equivalent; enrollment is limited to MBA students.

SCMT 614 Operations Management
Credits 1 to 3. 1 to 3 Lecture Hours.
Theory and applications of designing, analyzing and controlling productive systems in the allocation and use of resources to produce goods and services. May be repeated for up to 3 hours credit. Classification 6 students may not enroll in this course.
Prerequisites: SCMT 610 or equivalent; enrollment is limited to MBA students.

SCMT 616 Supply Chain Management
Credits 3. 3 Lecture Hours.
Focus on the integrated management of the total product delivery system; purchasing, inventory management and distribution functions with emphasis on physical and information flows.
Prerequisites: SCMT 614 and MBA student classification.

SCMT 636 Decision Support Systems
Credits 3. 3 Lecture Hours.
Use of decision support systems in business-related decision making, business environment, use of models, user interface with decision support systems and decision support systems examples. Classification 6 students may not enroll in this course.
Prerequisite: SCMT 303 or equivalent.

SCMT 638 Information Technology in Supply Chain Management
Credits 3. 3 Lecture Hours.
Review, evaluate, and contribute to the existing knowledge base regarding the management of information flows from automatic identification systems such as RFID.
Prerequisites: ISEN 615 and PhD students or Masters students with a thesis degree plan or approval of instructor.

SCMT 645 Business Process Design
Credits 3. 3 Lecture Hours.
Introduction to business process design and analysis; tools and techniques to document, analyze and improve business processes; Six Sigma process design and improvement; process metrics; computer simulation of processes; aligning business process with organizational goals and objectives; and case study of real world business problems.
Prerequisites: Graduate classification or approval of instructor; SCMT 614, SCMT 660 or approval of instructor.

SCMT 667 Logistics and Distribution Management
Credits 3. 3 Lecture Hours.
Contemporary logistics activities including inbound and outbound materials and service flows, with special emphasis on their relationships to the firm’s manufacturing function. Classification 6 students may not enroll in this course.
Prerequisite: SCMT 614 or SCMT 660 or equivalent.

SCMT 665 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed study on selected problems using recent developments in business research methods.
Prerequisites: Approval of instructor and graduate advisor.

SCMT 688 Doctoral Seminar in...
Credits 3. 3 Lecture Hours.
Evaluation of current research and controversial issues in management information systems, production/operations management or management science. May be repeated for credit five times as content varies. For doctoral students only.
Prerequisite: Approval of department head.

SCMT 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in identified areas of operations and supply chain management.

SCMT 690 Theory of Research in Information and Operations Management
Credits 3. 3 Lecture Hours.
Design of research and the evaluation of research results using examples from the current research literature. Classification 6 students may not enroll in this course.
Prerequisite: Approval of instructor.

SCMT 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Research for thesis or dissertation. Classification 6 students may not enroll in this course.

SCSC - Soil and Crop Sciences

Courses

SCSC 101 Introduction to Soil and Crop Science
Credit 1. 1 Lecture Hour.
Brief summary of sciences of agronomic crops, soils and water; management, production and processing of various crops; education, employment and research pertaining to respective professions.

SCSC 105 World Food and Fiber Crops
Credits 3. 2 Lecture Hours. 2 Lab Hours.
(AGRI 1307, 1407) World Food and Fiber Crops. Plant relationships, structure and development; environmental factors affecting plants; technological aspects of agricultural practices; food production for an increasing population.*

SCSC 201 Great Plains Settlement and Farming
Credits 3. 3 Lecture Hours.
American Indian hunting and farming; transformation by Manifest destiny, Homestead Act, railroads, Indian Wars, U.S. Army, crops and farm families; effects of World Wars, Great Depression, Dust Bowl, irrigation, fertilization, pest controls, precision farming.
SCSC 205 Problem Solving in Plant and Soil Systems
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Problems in management of soils, crops, and natural resources; problem solving skills including collecting, interpreting, using and communicating scientific and nonscientific data.

SCSC 291 Research
Credits 1 to 3. 1 to 3 Lecture Hours.
Research conducted under the direction of faculty member in agronomy. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

SCSC 301 Soil Science
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Evaluation of the nature and properties of soils; explanation of the various soils, their components and roles in the environment using the scientific methods and technology.
Prerequisite: Junior or senior classification, or approval of instructor.*

SCSC 302 Recreational Turf
Credits 3. 3 Lecture Hours.
Principles underlying construction and maintenance practices for turf facilities including athletic fields, golf courses, parks and home lawns; aesthetic, safety and economic aspects of turf varieties, soil conditions, plant protectants and maintenance equipment.
Prerequisite: Biology or approval of instructor.

SCSC 303 Crop Ecology
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Ecology of species adaptation and selection and management principles; crop establishment, growth and development, mineral nutrition, productivity and sustainability.
Prerequisite: SCSC 105.*

SCSC 304 Plant Breeding and Genetics
Credits 3. 3 Lecture Hours. 0 Lab Hours.
Genetic improvement of crops by hybridization and selection; special breeding methods and techniques applicable to naturally self-pollinated, cross-pollinated and asexually reproduced plants.
Prerequisite: SCSC 105.*

SCSC 305 Production Agronomy Experiences
Credit 1. 2 Lab Hours.
Agronomy industry practices related to crop production; site visits in Texas and in the Mississippi Delta include a review of farming equipment, conservation agriculture practices, agro-chemical distribution and sales, grain product processing and distribution and on-farm management techniques.
Prerequisites: Junior or senior classification or approval of instructor.

SCSC 306 Grain, Fiber and Oilseed Crops
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Geographical distribution, classification, physiology, principles of production, use of grain, fiber and oilseed crops and marketing.
Prerequisites: SCSC 105 and SCSC 301.*

SCSC 307 Crop Biology and Physiology
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Emphasis on seed biology, germination, development of cells and tissues, anatomy, and growth and development of crop plants; plant hormones and tropisms, membranes and membrane transport, water absorption and transport through plants, photosynthesis, respiration and carbohydrate metabolism, and flowering; environmental effects on crop adaptation, growth, development, and productivity.
Prerequisites: SCSC 205, junior or senior classification, or approval of instructor.

SCSC 308 Forage Crops
Credits 3. 3 Lecture Hours.
Description, analysis and evaluation of forage systems in relation to livestock and wildlife production and environmental conservation; principles of selection and management of establishment, weeds, nutrients, grazing and harvest for introduced species.
Prerequisite: Junior or senior classification or approval of instructor.*

SCSC 309 Water in Soils and Plants
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Fundamentals of plant water use, and water movement and storage in soils; evapotranspiration, plant water requirements and irrigation scheduling; issues impacting irrigation and water quality; techniques for measuring soil and plant water relations.
Prerequisite: Junior or senior classification, or approval of instructor.

SCSC 310 Soil Morphology and Interpretations
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Field study of morphological features of soil profiles and the morphological characterization of important soils of Texas in relation to soil use and management.
Prerequisite: SCSC 301 or registration therein.*

SCSC 311 Principles of Crop Production
Credits 3. 3 Lecture Hours.
Review of plant physiology and crop adaptation to mesoclimates; crop management factors of planting, pest control, plant nutrition, irrigation, GIS, and harvesting techniques; special units on organic farming, conservation agriculture, farming in low-rainfall climates, and bioenergy crops; influence of markets, government policies, and the global economy on cropping strategies.
Prerequisites: SCSC 307, junior or senior classification, or approval of instructor.

SCSC 312 Introductory Turfgrass Management Laboratory
Credit 1. 1 Lab Hour.
Fundamentals of turfgrass anatomy, growth habit, identification and characteristics of cool- and warm-season turfgrass species; understanding of seed quality and labeling, pesticide safety, handling, and application, and fertilizer sources, safety, and application; specialized equipment used in the turfgrass industry.
Prerequisite: SCSC 302 or registration therein.

SCSC 314 Life and Physical Environment
Credits 3. 3 Lecture Hours.
Description of physical environments in which living organisms reside: interaction and adaptation of plants, animals and humans to their physical environments; survival in extreme environments; creating livable artificial environments on earth and in space.
Prerequisite: Junior or senior classification.
SCSC 330 Social and Ethical Aspects of International Cropping Systems
Credits 3. 3 Lecture Hours. 0 Lab Hours.
Philosophical basis of ethical decisions; includes slavery, war, population growth, migration, farm workers, chemical inputs, genetically modified organisms, soil and water conservation and protection of wild species.
Prerequisite: Junior or senior classification.

SCSC 401/FIVS 401 Forensic Soil Science
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Examination of soils biology, chemistry and physical attributes to solve crimes; soil and geologic characteristics associated with crime scene examination; physical, biological and chemical characteristics and use of trace evidence.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: FIVS 401/SCSC 401.

SCSC 402 Crop Stress Management
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Identification, measurement, biology, physiology and management of crop stress; limitations of specific environments to crop productivity; morphological and physiological crop stress response mechanisms.
Prerequisites: SCSC 307, junior or senior classification, or approval of instructor.

SCSC 405 Soil and Water Microbiology
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Roles of soil and water microorganisms in the sustainability and productivity of various ecosystems with specific emphasis on plant-microbial interactions, nutrient cycling, degradation of pesticides and other xenobiotics, generation of trace gases, and soil and water quality; hands-on laboratory experience with current techniques in soil and water microbiology.
Prerequisites: Junior or senior classification, or approval of instructor.

SCSC 410 International Agricultural Systems
Credits 3. 3 Lecture Hours.
Contrast modern agriculture systems with those in developing countries; emphasis on natural resources and technologies interacting with economic and social development on a global scale.
Prerequisite: Junior or senior classification, or approval of instructor.

SCSC 420 Brazilian Agriculture and Food Production Systems
Credits 3 to 6. 3 to 6 Lecture Hours.
Comparison and study of Brazilian and U.S. agriculture and culture related to soil, water, and forest conservation and management in Brazil; tour and learn about Amazon River, rain forest, Brasilia, farm, ranch, and floral production systems, agricultural cooperatives and research, sugar and alcohol production, phosphate mining and production; visit points of interest.
Prerequisite: Junior or senior classification or approval of instructor.

SCSC 421 International Agricultural Research Centers - Mexico
Credits 3. 3 Lecture Hours.
International agricultural research; CIMMYT interaction; modern and underdeveloped tropical agricultural systems; introduction to Mexican culture; critical evaluation of complex and international agricultural issues and research programs.
Prerequisites: Junior or senior classification and approval of instructor.

SCSC 422 Soil Fertility and Plant Nutrient Management
Credits 3. 3 Lecture Hours.
Chemical and biological reactions in soils that influence nutrient availability to plants; environmental aspects associated with nutrient availability and fertilization, especially for nitrogen (N) and phosphorus (P).
Prerequisites: SCSC 301, junior or senior classification, or approval of instructor.

SCSC 423 Natural Resources and Agricultural Sustainability in UK
Credits 3. 3 Lecture Hours.
Environmental impacts and sustainability of United Kingdom and U.S. agriculture compared; soil, water, crop, and environmental management; conservation of watersheds; production of hydropower; sustainable use of water resources; cultural immersion.
Prerequisites: Junior or senior classification and approval of instructor.

SCSC 425 Biofuels and the Environment
Credits 2. 2 Lecture Hours.
Biofuel crop use and disposal; production systems; conversion technologies; impacts of bioenergy production on sustainability, environment, and soil and water quality; carbon and energy budgets.
Prerequisites: SCSC 301 or approval of instructor; junior or senior classification.

SCSC 427 Sports Field Construction
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Development of knowledge, skills, and experiences for the design and construction of a turfgrass-based sports field; case studies and visits to model fields, guest lectures from sports field owners, designers, and construction company managers; hands-on construction of a small-scale sand-based sports field.
Prerequisites: SCSC 309, junior or senior classification, or approval of instructor.

SCSC 428 Advanced Turf Ecology and Physiology
Credits 3. 3 Lecture Hours.
Examination of how environmental stresses, genetics, and cultural management practices influence the growth, development, and physiology of turfgrasses; exploration of how turf communities function within urban landscapes; introduction to environmental, social, and political issues encountered when managing these areas.

SCSC 429 Turf Management Systems
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Development of turf management plans for large turfgrass sites including parks, golf courses and sports facilities; use of case studies to critically analyze turf management programs.
Prerequisite: SCSC 428.

SCSC 430 Turfgrass Maintenance
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Activities in a day-to-day turfgrass maintenance operation; decision-making in culture, equipment, irrigation systems, budgets, records and labor management. Laboratory includes principles and actual mechanical procedures involved in maintaining turfgrass.
Prerequisite: SCSC 428 or approval of instructor.*

SCSC 432 Soil Fertility and Plant Nutrient Management Laboratory
Credit 1. 3 Lab Hours.
Methods used in soil testing, fertilizer recommendations, chemical and physical properties of soils, and determination of specific characteristics of a collected and analyzed soil sample.
Prerequisites: SCSC 301; SCSC 422 or registration therein, junior or senior classification, or approval of instructor.*
SCSC 435 Ecology of Agrichemicals in Field Crops and Turf
Credits 3. 3 Lecture Hours.
History, rationale, and ecological consequences of irrigation, fertilization, and pesticide applications in crop production; methods to determine the fate of agrichemicals in water, soil, and food; assessment of the risks and benefits of agrichemical use to human health, farm economy and natural habitats.
Prerequisite: CHEM 101.

SCSC 441 Crop Production Systems
Credits 3. 3 Lecture Hours.
Integration of crop production and management concepts through a systems approach; application of concepts using case studies and team projects.
Prerequisite: Senior classification or approval of instructor.

SCSC 444 Forage Ecology and Management
Credits 3. 3 Lecture Hours.
Investigation of multidisciplinary approaches toward the development of integrated forage, livestock, and wildlife production systems that are economically feasible and environmentally sustainable.
Prerequisite: Junior or senior classification or approval of instructor.

SCSC 445 Soil Physics
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Fundamentals of soil physics; soil texture, structure, water, air and thermal relations and their relations to the solution of problems in crop production, irrigation, pollution and engineering.
Prerequisite: 9 hours of soils and physics with minimum of 3 hours of each, or approval of instructor.*

SCSC 446 Weed Management and Ecology
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Practical information related to weed management and ecology for various vegetative systems to include turf and agronomic crops; calibration of applicators, herbicide labels, mode of action of herbicides, herbicide-resistant weed management.
Prerequisites: CHEM 222, SCSC 307, junior or senior classification, or approval of instructor.

SCSC 450 Chemical Weed Control
Credits 3. 3 Lecture Hours.
Fundamentals of chemical weed control; relationships of families of herbicides, basis for selectivity of herbicides, fate of herbicides in plants and soils and effect of herbicidal additives.
Prerequisites: CHEM 222 or CHEM 227 and CHEM 237; approval of instructor.

SCSC 452 Chemical Weed Control Laboratory
Credit 1. 0 Lecture Hours. 2 Lab Hours.
Important weed problems in Texas; herbicides and equipment used for herbicidal application.
Prerequisite: SCSC 450 or registration therein.*

SCSC 455 Environmental Soil and Water Science
Credits 3. 3 Lecture Hours.
Discussion of physical, chemical, and biological properties of soil and water and the impact on productivity and sustainability of various ecosystems; application of the knowledge of properties and soil processes to develop and evaluate strategies for protecting and/or improving soil and water quality.
Prerequisite: SCSC 301 or approval of instructor.

SCSC 458 Watershed and Water Quality Management
Credits 3. 3 Lecture Hours.
Land use impact on surface and ground water chemistry; legislation impacting water quality; surface and groundwater impairment and restoration.
Prerequisite: CHEM 101 or equivalent or approval of instructor; junior or senior classification.

SCSC 460 Problems in Agronomy - Plants
Credit 1. 1 Lecture Hour.
Development of writing skills in the plant science aspect of agronomy; instruction in drafting, editing, and revising technical and popular reports for specific audiences; critical thinking, analytical reading, peer review, and discussion are emphasized.
Prerequisite: Junior or senior classification.

SCSC 461 Problems in Agronomy - Soils
Credit 1. 1 Lecture Hour.
Development of writing skills in the soil science aspect of agronomy: instruction in drafting, editing, and revising technical and popular reports for specific audiences; critical thinking, analytical reading, peer review, and discussion are emphasized.
Prerequisite: Junior or senior classification.

SCSC 465 Directed Studies
Credits 1 to 4. 1 to 4 Lecture Hours.
For advanced undergraduates to permit field or laboratory investigation or study of subject matter not included in established courses.
Prerequisite: 10 hours of junior and senior agronomy or approval of instructor.

SCSC 468 Internship
Credits 1 to 3. 1 to 3 Lecture Hours.
Practical on-the-job experience in the student's area of specialization.
Prerequisites: Junior or senior classification; approval of instructor; 2.0 or better GPR in major and overall.

SCSC 481 Senior Seminar
Credits 2. 2 Lecture Hours.
Capstone course bringing together student experiences, exams, and exercises necessary for completing and assessing curriculum program learning outcomes.
Prerequisite: Senior classification.

SCSC 484 Internship
Credits 1 to 3. 1 to 3 Lecture Hours.
For advanced undergraduates to permit field or laboratory investigation or study of subject matter not included in established courses.
Prerequisite: 10 hours of junior and senior agronomy or approval of instructor.

SCSC 485 Directed Studies
Credits 1 to 4. 1 to 4 Lecture Hours.
For advanced undergraduates to permit field or laboratory investigation or study of subject matter not included in established courses.
Prerequisite: 10 hours of junior and senior agronomy or approval of instructor.

SCSC 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of agronomy. May be repeated for credit.
Prerequisite: Approval of department head.*

SCSC 491 Research
Credits 1 to 3. 1 to 3 Lecture Hours.
Research conducted under the direction of faculty member in agronomy. May be repeated 2 times for credit. Registration in multiple sections of this course are possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification and approval of instructor.

SCSC 603 Cytological and Histological Principles in Plant Breeding
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Modern concepts and recent developments for advanced students in plant and soil sciences and related fields employing microscopic evaluation; specimen preparation, stain technology, theory and use of microscopes, micromanipulators, microtomes, the microtome cryostat, use of equipment in modern cytological research.
Prerequisite: Graduate classification.
SCSC 605 Pedology
Credits 3. 3 Lecture Hours.
Soil genesis, morphology and classification; development of a working knowledge of soil taxonomy and diagnostic horizons used in placement of soils.
Prerequisites: SCSC 301 or equivalent; or approval of instructor. Two 2-day field trips for which departmental fees may be assessed to cover costs.

SCSC 607 Crop Physiology
Credits 3. 3 Lecture Hours.
Growth and productivity of major agronomic crops as related to plant physiological processes and environmental parameters, including manipulation of crop growth for enhanced production.
Prerequisites: SCSC 303; MEPS 313.

SCSC 609 Integrated Farming Systems
Credits 3. 3 Lecture Hours.
System-oriented course that stimulates critical thinking and debate regarding the strength and weakness of modern crop and livestock production systems within the context of ecological and economic sustainability; evaluates conservation tillage, integrated nutrient and pest management and multiple cropping systems.
Prerequisite: Approval of instructor.

SCSC 610 Host Plant Resistance
Credits 3. 3 Lecture Hours.
Host plant resistance programs from the standpoint of the plant breeder, plant pathologist and entomologist; team taught with each discipline represented; roundtable discussion of assigned readings and lectures.
Prerequisite: Approval of instructor.
Cross Listing: ENTO 610 and PLPA 610.

SCSC 611 Introduction to Environmental Biophysics
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Theoretical and experimental analysis of interactions between living organisms and their environments; measurement and modeling of the physical environment; measurement and modeling of energy and mass transfer between organisms and their environments, and of organism response to fluxes of mass and energy.
Prerequisites: Graduate classification and approval of instructor.

SCSC 613 Ethical Aspects of International Agricultural Systems
Credits 3. 3 Lecture Hours. 0 Lab Hours.
Diverse theories of morality; ethical dimensions of population growth, high yielding crop production systems, genetic engineering, and use of land, soil, and water.
Prerequisite: Approval of instructor.

SCSC 615 Reclamation of Drastically Disturbed Lands
Credits 3. 3 Lecture Hours.
Theoretical and practical aspects of reclamation of lands disturbed during mining of lignite, uranium, phosphorous, oil shale and other minerals and disturbances due to industrial activities; emphasis on physical and chemical characteristics of disturbed materials and their impact on establishment of permanent vegetation.
Prerequisite: SCSC 301 or approval of instructor.

SCSC 618 Analysis of Environmental Systems
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Classical and contemporary methods for analyzing chemical components of environmental systems, soil, water, plants and gases; environmental chemistry coupled with experiential.
Prerequisite: Graduate classification.

SCSC 619 Molecular Methods for Microbial Characterization
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Underlying principles of molecular methods for microbial detection and characterization in natural and man-made ecosystems; emphasis on method application and data interpretation; emphasis on microbial pathogens and indicator organisms in foods and environment; laboratory covers select protocols.
Prerequisites: SCSC 405; FSTC 326/DASC 326; POSC 429; approval of instructor.
Cross Listing: FSTC 619, POSC 619, VTMI 619.

SCSC 620 Brazilian Agriculture and Food Production Systems
Credits 3. 3 Lecture Hours.
Compare Brazilian and U.S. agriculture and culture related to soil, water, and forest conservation and management in Brazil; tour and learn about Amazon River, rain forest, Brasilia, farm, ranch, and floral production systems, agricultural cooperatives and research, sugar and alcohol production, phosphate mining and production; visit points of interest.
Prerequisite: Approval of instructor.

SCSC 621 International Agricultural Research Centers - MX
Credits 3. 3 Lecture Hours.
Introduction to international agricultural research, Consultative Group on International Agriculture activity; modern and underdeveloped tropical agricultural systems; introduction to Mexican culture; critical evaluation of complex and international agricultural issues and research programs.
Prerequisites: Approval of instructor; graduate classification.

SCSC 623 Natural Resources and Agricultural Sustainability in UK
Credits 3. 3 Lecture Hours.
Environmental impacts and sustainability of United Kingdom and U.S. agriculture compared; soil, water, crop, and environmental management; conservation of watersheds; production of hydropower; sustainable use of water resources; cultural immersion.
Prerequisite: Approval of instructor.

SCSC 624 Soil Chemistry
Credits 3. 3 Lecture Hours.
Chemistry of clay minerals, inorganic solid phases, and organic colloids in soil; mass transfer reactions in soils: absorption/desorption, precipitation/dissolution, gas/liquid phase exchange; principles of soil acidity and salinity; introduction to application of equilibrium concepts in soils.
Prerequisites: SCSC 301 or approval of instructor.

SCSC 625 Biofuels and the Environment
Credits 2. 2 Lecture Hours.
Biofuel crop use and disposal; production systems; conversion technologies; impacts of bioenergy production on sustainability, environment, and soil and water quality; carbon and energy budgets.
Prerequisite: SCSC 301 or approval of instructor.

SCSC 626 Soil Mineralogy
Credits 5. 3 Lecture Hours. 4 Lab Hours.
Crystal structures and properties of important minerals in soils and sediments especially clay minerals and oxides combined with identification techniques involving theory and practice with x-ray diffraction, electron microscopy, infrared and chemical methods.

SCSC 627 Soil Chemistry and Fertility
Credits 3. 3 Lecture Hours.
Chemical and biological behavior of nitrogen, phosphorus and potassium in soils; secondary nutrients, micronutrients and soil acidity and liming; interpretation of soil chemical/biochemical research from historical and current literature and relationships with nutrient availability, plant uptake, and environmental quality.
Prerequisites: SCSC 422; MEPS 313.
SCSC 629/VTMI 629 Laboratory Quality Systems  
Credits 3. 3 Lecture Hours.  
Quality systems and method development used within a laboratory; ensuring the integrity of procedures used in lab processes, chain of custody, information management, and international laboratory standards; regulatory requirements for laboratory operation; bio-security precautions; laboratory management.  
Cross Listing: VTMI 629/SCSC 629.

SCSC 630/FSTC 630 Cereal Grains for Human Food  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Fundamental concepts of dry milling, wet milling, oil extraction, baking, malting, brewing, storage, sanitation, and quality evaluation and control interrelated with physical and biochemical properties of cereals and their products; use of instruments and techniques to evaluate cereal quality.  
Prerequisite: Approval of instructor.  
Cross Listing: FSTC 630/SCSC 630.

SCSC 631 Prerequisite Programs for Feed Industry HACCP  
Credit 1. 1 Lecture Hour.  
Development of preliminary science-based risk management decision factors in feed industry; understanding and complying with FDA regulatory requirements for animal feed; application of international standards; prerequisite programs for Feed Industry Hazard Analysis and Critical Control Point (HACCP); module one of three. Prerequisite: Graduate classification.

SCSC 632 Feed Industry HACCP - Principles and Plan Development  
Credit 1. 1 Lecture Hour.  
Principles of Feed Industry Hazard Analysis and Critical Control Point (HACCP) plan development; science-based risk analysis of decision factors; regulatory requirements of HACCP; module two of three. Prerequisite: SCSC 631.

SCSC 633 Feed Industry HACCP - Advanced Plan Development  
Credit 1. 1 Lecture Hour.  
Principles of Feed Industry Hazard Analysis and Critical Control Point (HACCP) advanced plan development; case studies of HACCP principles; HACCP plan development for feed industry companies; module three of three. Prerequisites: SCSC 631 and SCSC 632.

SCSC 634 Regulatory Science: Principles & Practices in Food Systems  
Credits 3. 3 Lecture Hours.  
Regulatory Science: Principles & Practices in Food Systems. Regulatory tools, standards and approaches in production, processing and distribution of agricultural goods; development and implementation of regulations; interdependence of federal and state agencies, use of risk analysis.

SCSC 635/AGEC 639 Comparative Global Standards in Food Systems  
Credits 3. 3 Lecture Hours.  
Laws, regulations and standards governing the production, distribution, processing and marketing of food across regions of the world; international standard setting bodies and risk assessment committees; regulatory equivalency and harmonization; product approval procedures; cost/benefits of global standards and trade agreements.  
Cross Listing: AGEC 639/SCSC 635.

SCSC 636 Regulatory Science: Methodology in Food Systems  
Credits 3. 3 Lecture Hours.  
Risk management methodology including investigation of food and feed firms, conducting internal compliance audits; sample collection, chain-of-custody, trace-back and trace-forward, recalls, label review, data interpretation, risk ranking, resource prioritization, incident command and rapid response.  
Prerequisite: SCSC 634.

SCSC 637 Environmental Microbiology  
Credits 3. 3 Lecture Hours.  
Microbial diversity and interactions in various environments with emphasis on soil and freshwater systems. Molecular methods for detection and characterization of indigenous and introduced microorganisms. Environmental sources and fate of pathogens. Biotechnological applications of environmental microorganisms.

SCSC 640 Intellectual Property in the Plant Sciences  
Credits 3. 3 Lecture Hours.  
Introduction to major foci of intellectual property (IP) impacting plant sciences, including: 1) traditional vs. emerging knowledge economies, 2) governing statutes and treaties, 3) forms of IP, and 4) IP asset identification, valuation, capture and deployment towards understanding the best practices for IP strategy development and IP portfolio management.

SCSC 641 Plant Breeding I  
Credits 3. 3 Lecture Hours.  
Theoretical and practical aspects of plant breeding including genetic basis; application of breeding methods and interdisciplinary considerations in breeding problems.  
Prerequisites: SCSC 304 or HORT 404/GENE 404; GENE 301; STAT 651.

SCSC 642 Plant Breeding II  
Credits 3. 3 Lecture Hours.  
Expectations of genetic improvement for different plant breeding methods; relative efficiency for crops of different reproductive mechanisms; genetic variances, covariances and genotype-environment interaction components of variance used in planning selection procedures.  
Prerequisites: SCSC 641; GENE 613; STAT 619.

SCSC 643/GENE 643 Molecular Quantitative Genetics and Plant Breeding  
Credits 3. 3 Lecture Hours.  
Classical, applied and molecular aspects of quantitative genetics in plant breeding; genetic relationships; genetic diversity; genetic phenomena (linkage, heterosis and epistasis); genotype by environment interaction; mapping quantitative trait loci (QTL); genomic and marker-assisted selection; application of statistical software.  
Prerequisites: STAT 651, SCSC 642 or GENE 613; or approval of instructor.  
Cross Listing: GENE 643/SCSC 643.

SCSC 644 Forage Ecology and Management  
Credits 3. 3 Lecture Hours.  
Investigation of multidisciplinary approaches toward the development of integrated forage, livestock, and wildlife production systems that are economically feasible and environmentally sustainable.  
Prerequisites: Approval of instructor and graduate classification.
SCSC 645/HORT 645 World Agriculture and International Plant Breeding
Credit 1. 1 Lecture Hour.
Evolution of world agriculture; plant breeding and improved varieties; international agricultural research centers and green revolution; population growth; environmental challenges; IPR; role of plant breeding and biotechnology in meeting world food needs. 
Prerequisite: SCSC 304, HORT 404/GENE 404 or approval of instructor.
Cross Listing: HORT 645/SCSC 645.

SCSC 646 Advanced Studies in Cotton Fiber Quality and Its Measurements
Credits 3. 3 Lecture Hours.
Advanced studies in cotton fiber quality and its measurement will explore the morphology of cotton fiber growth, the instruments used to determine fiber quality, and the interpretation of quality measurements.

SCSC 650 Mode of Action and Environmental Fate of Herbicides
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Relationships between physical-chemical characteristics of herbicides and their biological activity, selectivity, environmental fate in soil, water, and plants. Laboratory includes practical applications of gas and liquid chromatography, liquid scintillation counting and plant bioassays.
Prerequisite: SCCS 450 or approval of instructor.

SCSC 651 Weed Biology and Ecology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Fundamentals of weed invasion, development, persistence and competition with agronomic crops; consideration of ecological concepts important to weed-crop relationships as influenced by weed control and other cultural practices. Practical consideration of integrated weed management systems and weed identification.
Prerequisites: SCSC 303; MEPS 313.

SCSC 654 Analysis of Complex Genomes
Credits 3. 3 Lecture Hours.
History and current status of genetic and molecular analysis of higher eukaryotic genomes; coverage of techniques for dissection of genomes into manageable parts; investigations in genetics, breeding and evolution; emphasis on quantitative inheritance, genetic mapping, physical mapping, map-based cloning, with examples drawn from a wide range of organisms.
Prerequisite: GENE 603 or GENE 431/BICH 431.
Cross Listing: GENE 654 and MEPS 654.

SCSC 655 Analysis of Complex Genomes--Lab
Credits 3. 0 Lecture Hours. 7 Lab Hours.
Laboratory methods in molecular genetic techniques for genetic mapping, physical mapping, and map-based cloning of both qualitative and quantitative phenotypes.
Prerequisite: GENE 603 or equivalent or approval of instructor.
Cross Listing: GENE 655 and MEPS 655.

SCSC 657 Environmental Soil and Water Science
Credits 3. 3 Lecture Hours.
Discussion of physical, chemical, and biological properties of soil and water and the impact on productivity and sustainability of various ecosystems; application of the knowledge of properties and soil processes to develop and evaluate strategies for protecting and/or improving soil and water quality.
Prerequisite: SCSC 301. Stacked with SCSC 455.

SCSC 658 Watershed and Water Quality Management
Credits 3. 3 Lecture Hours.
Land use impact on surface and ground water chemistry; legislation impacting water quality; surface and groundwater impairment and restoration; case studies in best management practices.
Prerequisite: Graduate classification.

SCSC 660 Experimental Designs in Agriculture
Credits 3. 3 Lecture Hours.
Fundamental principles and procedures of experimental designs in agricultural sciences; emphasis includes factorial designs, predicting outputs, use of covariance, balanced and unbalanced experimental designs as related to common agricultural research projects under field, greenhouse or growth chamber culture; familiarization with computer programming of common statistical software.
Prerequisite: STAT 651.

SCSC 663/ESSM 663 Applied Spatial Statistics
Credits 4. 3 Lecture Hours. 2 Lab Hours.
An introduction to the theory and practice of spatial statistics as applied to the natural resources. Spatial analyses focusing primarily on ordinary kriging, point processes, and lattice data.
Prerequisites: MATH 141, MATH 142, STAT 651, or equivalents; ESSM 651/BAEN 651 preferred.
Cross Listing: ESSM 663/SCSC 663.

SCSC 671/MEPS 671 Plant Growth and Development
Credits 3. 3 Lecture Hours.
Comprehensive analysis of plant development primarily focused on the molecular and cellular processes underlying morphogenesis, vegetative growth and reproduction; role of the major phytohormones as coordinators of development will be analyzed; plastic developmental responses to conditioning environmental signals.
Prerequisites: MEPS 601 or approval of instructor.
Cross Listing: MEPS 671/SCSC 671.

SCSC 681 Seminar
Credit 1. 1 Lecture Hour.
For graduate students and staff members in soils and crops; presentation and discussion of special topics and research data; participation required of all graduate students in agronomy.

SCSC 684 Professional Internship
Credits 1 to 16. 1 to 16 Lecture Hours.
Program planned to provide professional training in student's particular field of interest. Faculty and employer will supervise the activity.
Prerequisite: Approval of instructor.

SCSC 685 Directed Studies
Credits 1 to 4. 1 to 4 Lecture Hours.
Advanced problems in some phase of agronomy not directly related to thesis or dissertation.

SCSC 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of agronomy. May be repeated for credit.
Prerequisite: Approval of department head.

SCSC 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Investigations leading to thesis or dissertation.

SEFB - Special Ed Field Based
Courses

SEFB 420 Education and Employment Issues in Secondary Special Education
Credits 3. 2 Lecture Hours. 3 Other Hours.
Field-based course involving psychological, social, physical and cognitive development of secondary-age students; career assessment; programmatic options within educational and employment settings; transition models from school to adult settings.
Prerequisites: Admission to professional phase of program.

SEFB 425 Student Teaching in Special Education
Credits 6. 24 Other Hours.
(0-24) Observation and participation in an accredited special education classroom; techniques of teaching special education and appropriate instructional strategies for students with exceptionalities. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisites: Admission to professional phase of program and to student teaching.

SEFB 426 Effective Instruction of Students of Diverse Abilities
Credits 3. 2 Lecture Hours. 3 Other Hours.
Field-based application of effective instructional strategies for teaching students of diverse abilities; analysis of teaching style and strategies for improving ability to work with diverse populations. To be taken concurrently with SEFB 425. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisites: Senior classification; 2.5 GPA in teaching field; approval of department head.

SEFB 430 Practicum in Applied Behavior Analysis
Credits 3. 9 Other Hours.
University-supervised experience related to specializations in special education and behavior analysis. May be taken 8 times for credit.
Prerequisites: Junior or senior classification; approval of instructor; approval of department head.

SEFB 431 Intensive Practicum in Applied Behavior Analysis
Credits 3. 9 Other Hours.
University-supervised intensive experience related to specializations in special education and behavior analysis. May be taken 8 times for credit.
Prerequisites: Junior or senior classification; approval of instructor; approval of department head.

SEFB 499 SPECIAL ED FIELD BASE
Credits 15. 15 Lecture Hours.

SEFB 618 Applied Behavior Management in the Classroom
Credits 3. 3 Lecture Hours.
Field-based course related to effective management of challenging behavior problems in the classroom using proactive classroom strategies, effective instruction and planned behavior interventions; discussion and applications of methods for observing, assessing and analyzing challenging behaviors.
Prerequisites: Graduate classification and approval of department head.

SEFB 630 Practicum in Applied Behavior Analysis
Credits 3. 9 Other Hours.
University-supervised experience related to specializations in special education and behavior analysis. May be taken eight times for credit.
Prerequisites: Graduate classification; SEFB 618; approval of department head.

SEFB 631 Intensive Practicum in Applied Behavior Analysis
Credits 3. 9 Other Hours.
University-supervised intensive experience related to specializations in special education and behavior analysis. May be taken eight times for credit.
Prerequisites: Graduate classification; SEFB 618; approval of department head.

SEFB 684 Internship in Special Education
Credits 1 to 4. 1 to 16 Other Hours.
University-directed experience in a professional employment setting; full-time teaching and responsibility in a classroom with students with disabilities. May be taken 4 times.
Prerequisites: Graduate classification and approval of department head.

SENG - Safety Engineering

Courses

SENG 309/NUEN 309 Radiological Safety
Credits 3. 3 Lecture Hours.
Interactions of nuclear radiations with matter and biological systems; theory and practice of radiation dosimetry as applied to radiation protection; design and application of radiation dosimetry systems for personnel monitoring, area radiation monitoring and accident situation; includes external and internal dosimetry as well as long-term risk analysis.
Prerequisite: NUEN 302.
Cross Listing: NUEN 309/SENG 309.

SENG 310 Industrial Hygiene Engineering
Credits 3. 3 Lecture Hours.
Application of scientific and engineering principles in the selection and design of control systems related to chemical, physical and ergonomic exposures in the process and manufacturing industries; relationships of criteria, analysis and specifications for the assessment and control of occupational related illnesses.
Prerequisites: CHEM 107; MATH 308; PHYS 208; or approval of instructor.

SENG 312 System Safety Engineering
Credits 3. 3 Lecture Hours.
Application of system safety analytical techniques to the design process; emphasis on the management of a system safety or product safety program; relationship with other disciplines such as reliability, maintainability, human factors and product liability applications.
Prerequisite: Junior classification.

SENG 321 Industrial Safety Engineering
Credits 3. 3 Lecture Hours.
Application of scientific and engineering principles in the selection and design of control systems related to chemical, physical and ergonomic exposures in the process and manufacturing industries; relationships of criteria, analysis and specifications for the assessment and control of occupational related illnesses.
Prerequisites: CHEM 107; MATH 308; PHYS 208; or approval of instructor.

SENG 322 Fire Protection Engineering - Facilities Design
Credits 3. 3 Lecture Hours.
Design of facilities from a fire protection engineering viewpoint including fire detection and fire control systems; materials, equipment, exposures, occupancies and processes; both public and industrial occupancies studied to determine fire protection design specifications.
Prerequisite: SENG 322 or approval of instructor.
SENG 430/CHEN 430 Risk Analysis in Safety Engineering  
Credits 3. 3 Lecture Hours.  
Concepts of risk and risk assessment, which uses all available information to provide a foundation for risk-informed and cost-effective engineering practices; examples and exercises are drawn from a variety of engineering areas.  
Prerequisite: Junior or senior classification.  
Cross Listing: CHEN 430/SENG 430.  

SENG 455/CHEN 455 Process Safety Engineering  
Credits 3. 3 Lecture Hours.  
Applications of engineering principles to process safety and hazards analysis, mitigation, and prevention, with special emphasis on the chemical process industries; includes source modeling for leakage rates, dispersion, analysis, relief valve sizing, fire and explosion damage analysis, hazards identification, risk analysis, accident investigations.  
Prerequisite: Senior classification in any engineering major.  
Cross Listing: CHEN 455/SENG 455.  

SENG 460/CHEN 460 Quantitative Risk Analysis in Safety Engineering  
Credits 3. 3 Lecture Hours.  
Fundamental concepts, techniques, and applications of risk analysis and risk-informed decision making for engineering students; practical uses of probabilistic methods are demonstrated in exercises and case studies from diverse engineering areas.  
Prerequisite: Senior or graduate classification.  
Cross Listing: CHEN 460/SENG 460.  

SENG 477 Air Pollution Engineering  
Credits 3. 3 Lecture Hours.  
Design of air pollution abatement equipment and systems to include cyclones, bag filters and scrubbers; air pollution regulations; permitting; dispersion modeling; National Ambient Air Quality Standards.  
Prerequisite: ENGR 214 or equivalent.  
Cross Listing: BAEN 477 and MEEN 477.  

SENG 485 Directed Studies  
Credits 1 to 4. 1 to 4 Other Hours.  
Permits students to develop special projects in industrial hygiene engineering, safety engineering or fire protection engineering. Project must be approved by department head.  

SENG 489 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in industrial hygiene engineering, safety engineering or fire protection engineering of specific student interest. May be repeated for credit.  
Prerequisite: Approval of instructor.  

SENG 655/CHEN 655 Process Safety Engineering  
Credits 3. 3 Lecture Hours.  
Applications of engineering principles to process hazards analysis including source and dispersion modeling, emergency relief systems, fire and explosion prevention and mitigation, hazard identification, risk assessment, process safety management, etc.  
Prerequisite: Approval of instructor.  
Cross Listing: CHEN 655/SENG 655.  

SENG 660 Quantitative Risk Analysis  
Credits 3. 3 Lecture Hours.  
Fundamental concepts, techniques, and applications of quantitative risk analysis and risk-informed decision making for students in all engineering fields. Practical uses of probabilistic methods are demonstrated in exercises and case studies from diverse engineering areas.  
Prerequisite: Graduate or Senior status.  
Cross Listing: CHEN 660 and ISEN 660.  

SENG 670 Industrial Safety Engineering  
Credits 3. 3 Lecture Hours.  
General concepts and techniques of safety engineering upon which more detailed and advanced applications may be based; applications of safety engineering principles to industrial and commercial systems; the concept of designing optimally safe systems.  

SENG 674 System Safety Engineering  
Credits 3. 3 Lecture Hours.  
Current system safety engineering analysis techniques; failure mode and effect and fault tree analysis. Engineering economic analysis is reviewed to develop skills for the safety engineer in presenting alternate solutions to management.  

SENG 677 Fire Protection Engineering  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Theory of combustion, characteristics of flammables, fire resistance, fire spread, fire protection principles, public and private fire service organization and equipment; automatic extinguishing systems. Fire protection analysis and design projects.  

SENG 680 Industrial Hygiene  
Credits 3. 3 Lecture Hours.  
Recognition of environmental stresses present in man-machine-environment systems and the effect of these stresses on human performance, safety and health; chemical, physical, ergonomic and biological exposures, manufacturing systems, materials and operations.  

SENG 681 Seminar  
Credit 1. 1 Other Hour.  
Formal presentations in industrial hygiene and safety engineering by students and professional industrial representatives.  

SENG 684 Professional Internship  
Credits 1 to 6. 1 to 6 Other Hours.  
Training under the supervision of practicing engineers in settings appropriate to the student’s professional objectives.  
Prerequisites: Approval of chair of student’s advisory committee and department head.  

SENG 685 Directed Studies  
Credits 1 to 12. 1 to 12 Other Hours.  
Investigation of topics not within the scope of thesis or dissertation research and not covered by other formal courses.  

SENG 689 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours.  
Selected topics in an identified area of safety engineering and industrial hygiene. May be repeated for credit.  
Prerequisite: Approval of instructor.  

SENG 691 Research  
Credits 1 to 23. 1 to 23 Other Hours.  
Research in industrial hygiene, safety engineering or related topics for thesis or dissertation.  

SOCl - Sociology
Courses

SOCI 203 U.S.-Mexico Border
Credits 3. 3 Lecture Hours.
Understanding of the U.S.-Mexico border from different theoretical perspectives, including structural violence, identity, power and demography.

SOCI 205 Introduction to Sociology
Credits 3. 3 Lecture Hours.
(SOCI 1301) Introduction to Sociology. Sociological perspectives including concepts and methods; social class and social status, the family, minorities, crime, religion, power, urbanization and population.

SOCI 206 Global Social Trends
Credits 3. 3 Lecture Hours.
Long-term trends in world societies from ancient times to the present and to the foreseeable future; emphasis on contemporary international issues and problems, techniques of analysis and future projections.

SOCI 207/WGST 207 Introduction to Gender and Society
Credits 3. 3 Lecture Hours.
Similarities and differences between females and males in a number of cultures throughout the world; sociological analysis of gender in relation to social structure.
Cross Listing: WGST 207/SOCI 207.

SOCI 210 Sociology of Technology and Science
Credits 3. 3 Lecture Hours.
Examination of technology and science from a variety of theoretical perspectives; process by which engineered products are influenced by social factors as well as how they in turn, impact society; exploration and critique of classic and contemporary theories of technological development.

SOCI 211 Sociology of Deviance
Credits 3. 3 Lecture Hours.
Perspectives on non-normative behavior; theories of deviance.

SOCI 212 Sociology of Popular Culture
Credits 3. 3 Lecture Hours.
Examination of the classic and contemporary social scientific definitions and theories of culture, and popular versus “high” or elite culture(s), various forms and arenas of popular culture, such as television, film, and music, institutions and popular culture, identity (race, class, gender and sexuality) and popular culture.

SOCI 217 Introduction to Race and Ethnicity
Credits 3. 3 Lecture Hours.
Introduction to the sociological examination of race and ethnicity in U.S. society; overview of theories and methods in the study of race and ethnicity, an understanding of how they function as individual and group-level identities, and organizing principles in social institutions.

SOCI 220 Methods of Social Research
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Relationships between sociological theory, research, qualitative evaluation of data; construction and use of analytical procedures and research techniques, and participant observation.

SOCI 229 Qualitative Methods
Credits 3. 3 Lecture Hours.
Methodologies in social research with emphasis on qualitative dimensions of inquiry; topics include in-depth interviewing, observation, unobtrusive measures, analysis of documents, fieldwork issues, ethics, note-taking, preliminary data analysis, and an overview of writing research reports based on qualitative research.

SOCI 230 Classical Sociological Theory
Credits 3. 3 Lecture Hours.
Role of theory in sociological study; the development of classical theoretical perspectives providing the foundation for contemporary theory.

SOCI 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of sociology. May be repeated for credit.
Prerequisite: Approval of instructor.

SOCI 302 Women and Religion
Credits 3. 3 Lecture Hours.
Investigation of women’s position in religious institutions historically and/or currently, religion’s influence on women’s roles and status, and women's attempts to define their own religious perspectives; draws on sociological and philosophical insights and methods.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: RELS 302 and WGST 302.

SOCI 304 Criminology
Credits 3. 3 Lecture Hours.
Criminal law and crime rates; explanations of criminal behavior; criminal careers, police, adult courts and prisons.
Prerequisite: Junior classification.

SOCI 306/ASIA 306 Society and Population of Modern China
Credits 3. 3 Lecture Hours.
Major trends and current topics in social and demographic aspects of the society of modern China, including Taiwan.
Prerequisite: Junior or senior classification.
Cross Listing: ASIA 306/SOCI 306.

SOCI 310/WGST 310 Motherhood in Society
Credits 3. 3 Lecture Hours.
Examines expectations and/or practices relating to motherhood, with consideration of their cultural impact; taught from a social science perspective.
Prerequisites: Junior or senior classification or approval of instructor.
Cross Listing: WGST 310/SOCI 310.

SOCI 312 Population and Society
Credits 3. 3 Lecture Hours.
The causes and implications of major population trends.

SOCI 313 Military, War and Society
Credits 3. 3 Lecture Hours.
Major trends and current topics in military organization; the experience and conduct of war; civil-military relations.

SOCI 314 Social Problems
Credits 3. 3 Lecture Hours.
Survey and exploration of causes and consequences of major social problems in American society such as poverty, unemployment, energy, alcohol, other drugs and sexual abuse.

SOCI 315/WGST 315 The Marriage Institution
Credits 3. 3 Lecture Hours.
Courtship, engagement, marriage, family formation, personal adjustment, conflict, financing and child rearing.
Cross Listing: WGST 315/SOCI 315.
SOCI 316/WGST 316 Sociology of Gender
Credits 3.3 Lecture Hours.
Sociological explanations of status differences between men and women; cross-cultural comparisons; gender role socialization, cultural stereotypes, discrimination; gender roles and status in the family, economy, religion, science, other social institutions; deviance, victimization and gender; recent social changes.
Cross Listing: WGST 316/SOCI 316.

SOCI 317/AFST 317 Racial and Ethnic Relations
Credits 3.3 Lecture Hours.
Status of racial and ethnic groups such as Native Americans, African Americans, Latino Americans, Asian Americans, European Americans, and other groups in the political, economic, legal and social systems of the United States.
Cross Listing: AFST 317/SOCI 317.

SOCI 320 Demographic Methods
Credits 3.3 Lecture Hours.
Procedures and techniques of demographic analysis; examination of demographic data; calculation of rates; construction of life tables; population estimates and projections.
Prerequisite: Junior or senior classification or approval of instructor.

SOCI 322 Industrial Sociology
Credits 3.3 Lecture Hours.
Work relations in jobs; social relations of groups and occupations and the social organization of small work groups, bureaucracies and modern large corporations.

SOCI 323/AFST 323 Sociology of African Americans
Credits 3.3 Lecture Hours.
Major elements of the Afro-American subculture in relation to white American society and its major social institutions.
Prerequisite: SOCI 205.
Cross Listing: AFST 323/SOCI 323.

SOCI 325/ASIA 325 International Business Behavior
Credits 3.3 Lecture Hours.
Theoretical models of Asian cultures and practical protocol/etiquette related to business and work in China, Thailand, South Korea, Japan, Australia, and other Pacific Rim nations; discussions of national character, managerial behavior and values.
Cross Listing: ASIA 325/SOCI 325.

SOCI 326/RELS 326 Sociology of Religion
Credits 3.3 Lecture Hours.
Institution of religion and religious-related behavior; relationship between dynamic and structural religion and contemporary society.
Prerequisite: SOCI 205.
Cross Listing: RELS 326/SOCI 326.

SOCI 327 Morality and Society
Credits 3.3 Lecture Hours.
Examination of how moral beliefs arise, how they change, how the moral order is maintained, and how that order affects the social structure; use of case-study method.

SOCI 328 Environmental Sociology
Credits 3.3 Lecture Hours.
A comprehensive overview of environmental sociology, including major sociological theories, concepts and policy issues affecting our understanding of environmental changes; emphasizes social factors that impact environmental quality.
Prerequisite: SOCI 205 or approval of instructor.

SOCI 329/ASIA 329 Pacific Rim Business Behavior
Credits 3.3 Lecture Hours.
Theoretical models of Asian cultures and practical protocol/etiquette related to business and work in China, Thailand, South Korea, Japan, Australia, and other Pacific Rim nations; discussions of national character, managerial behavior and values.
Cross Listing: ASIA 329/SOCI 329.

SOCI 330 Sociology of Nutrition
Credits 3.3 Lecture Hours.
Social factors affecting the kind and amount of food consumed around the world; social consequences of nutritional status for family functioning and for international development.

SOCI 332/WGST 332 Alternative Genders
Credits 3.3 Lecture Hours.
Examination of theories and case studies involving alternative genders and sexualities, studies in their cultural contexts and including the role of factors such as race, class, ethnicity, age, and physical characteristics.
Prerequisites: 3 credits in SOCI or WGST; junior or senior classification.
Cross Listing: WGST 332/SOCI 332.

SOCI 335 Sociology of Organizations
Credits 3.3 Lecture Hours.
How people act in organizations; structures in organizations; the relationship between organizations and their environments.

SOCI 337 International Migration
Credits 3.3 Lecture Hours.
Survey of theories and trends in international migration.
Prerequisite: Junior or senior classification, or approval of instructor.

SOCI 402 Sociology of Latin America
Credits 3.3 Lecture Hours.
Latin American society; integration of viewpoints from the humanities, arts and social sciences.
Prerequisite: Junior or senior classification or approval of instructor.

SOCI 403 Sociology of Latinos
Credits 3.3 Lecture Hours.
Exploration of social characteristics and acculturation problems of Mexican Americans in the United States; styles of life and cultural variability, social mobility, the struggle for advancement and identity through social movements.

SOCI 404/RPTS 404 Sociology of the Community
Credits 3.3 Lecture Hours.
Organization of American communities examining the bases of community, types of communities and the changes faced by communities.
Prerequisite: SOCI 205.
Cross Listing: RPTS 404/SOCI 404.

SOCI 411 Social Psychology
Credits 3.3 Lecture Hours.
Effects of social experience and groups on the development of personality, attitudes, values and behavior.
Prerequisite: 3 hours of sociology or psychology.
SOCI 412 Political Sociology  
Credits 3.3 Lecture Hours.  
Survey of social bases of power; state formation in advanced industrial societies; origins of welfare state; interrelation of nationalism; culture and class formation.  
Prerequisite: Junior or senior classification or approval of instructor.

SOCI 413 Social Movements  
Credits 3.3 Lecture Hours.  
Survey of social movements; emphasis on social movement participation, emergence and outcomes; analysis of revolutions and movements in the developing world; theory and methods of social movement research.  
Prerequisite: Junior or senior classification or approval of instructor.

SOCI 415 Sociology of Education  
Credits 3.3 Lecture Hours.  
Relationship of social structure and change to education; social background and student performance; teachers and their careers; bureaucracy and change in education.  
Prerequisite: SOCI 205.

SOCI 419 Social Class in Contemporary Society  
Credits 3.3 Lecture Hours.  
Composition and consequences of social class structure; social class explanations for lifestyle patterns, educational and occupational achievements.  
Prerequisite: SOCI 205.

SOCI 420 Advanced Methods of Social Research  
Credits 3.2 Lecture Hours.  
2 Lab Hours.  
Philosophy and methods of social research, including research design; methods of observation; questionnaires, interviews and other sources of social data; qualitative and quantitative techniques of inference, analysis and research report writing.  
Prerequisite: SOCI 220.

SOCI 423 Globalization and Social Change  
Credits 3.3 Lecture Hours.  
Examines the effects of globalization on social structure including politics, governments, corporations, work and inequality.  
Prerequisite: Junior or senior classification or approval of instructor.

SOCI 424/WGST 424 Women and Work in Society  
Credits 3.3 Lecture Hours.  
Social context of women's work; work patterns, labor force participation, occupational destinations and occupational mobility; alternatives to the conventional division of labor by sex in society.  
Cross Listing: WGST 424/SOCI 424.

SOCI 425 Medical Sociology  
Credits 3.3 Lecture Hours.  
Organization, value systems and practice of medicine and the provision of health care in the U.S.; role of physicians, health occupations and patients; marginal and folk medicine.  
Prerequisite: SOCI 205.

SOCI 426 Sociology of Work  
Credits 3.3 Lecture Hours.  
Overview of classical and contemporary theories of work, changes in labor market structure; contemporary work place organization; occupational stratification by race, class, and gender.  
Prerequisite: Junior or senior classification or approval of instructor.

SOCI 430 Contemporary Sociological Theory  
Credits 3.3 Lecture Hours.  
Basic ideas of contemporary sociological theory: structuralism, functionalism, conflict, symbolic interaction, exchange and their application to current research.  
Prerequisite: SOCI 230.

SOCI 445 Sociology of Law  
Credits 3.3 Lecture Hours.  
Introduction to the sociology of law; the relation of law to general social control and to organizational dynamics.

SOCI 463 Gender in Asia  
Credits 3.3 Lecture Hours.  
Gender dynamics in Asia; changes in gender roles; women's movements; women and the economy; women and politics; men's and women's private lives.  
Prerequisite: Junior or senior classification or approval of instructor.  
Cross Listing: ASIA 463 and WGST 463.

SOCI 478 Professional Development in Sociology I  
Credit 1.1 Lecture Hour.  
Career fields available to sociology majors, including the nature of the work, professional expectations, and the credentials for entry in the fields.  
Prerequisite: Sociology major; junior or senior classification.

SOCI 479 Professional Development in Sociology II  
Credits 2.2 Lecture Hours.  
Preparation for careers in sociology-related professionals by in-depth research of prospective career fields, development of oral, written, and media skills, formation of professional networks, and training in professional ethics, cultural diversity, and leadership.  
Prerequisite: Sociology major; junior or senior classification.

SOCI 484 Field Practicum  
Credits 0 to 4.0 to 4 Other Hours.  
Participation in an approved agency. Field experience will be supervised by selected agency personnel and appropriate faculty. Experiences and requirements will vary slightly according to placement and student interests.  
Prerequisites: Major in sociology; 12 hours of sociology; approval of undergraduate advisor.

SOCI 485 Directed Studies  
Credits 0 to 3.0 to 3 Other Hours.  
Special problems not covered by other courses. Course depends upon needs and interest of the student and upon the number of credit hours.  
Prerequisite: Senior classification in sociology.

SOCI 489 Special Topics in...  
Credits 1 to 4.1 to 4 Lecture Hours.  
Selected topics in an identified area of sociology. May be repeated for credit.  
Prerequisite: Approval of instructor.

SOCI 491 Research  
Credits 0 to 3.0 to 3 Other Hours.  
Research conducted under the direction of a chosen faculty member in sociology. May be repeated for a maximum of 3 hours total credit.  
Prerequisites: Junior or senior classification and approval of instructor.

SOCI 603/WGST 603 The Contemporary Family  
Credits 3.3 Lecture Hours.  
Review and criticism of theories developed for study of the family; family formation, dynamics, conflicts, power, dissolution; subcultural family forms and responses to social change.  
Cross Listing: WGST 603.
SOCI 604 Comparative Historical Methods
Credits 3.3 Lecture Hours.
Surveys key methodological issues, including the logic of comparative
design and analysis of primary and secondary sources. Exemplars of
important comparative historical research—both classics and more recent
publications—will be reviewed.
Prerequisite: Graduate classification.

SOCI 605 Social Movements
Credits 3.3 Lecture Hours.
Surveys the literature on social movements including the topics of
movement emergence, movement outcomes, state repression, and
revolutions; reviews contemporary debates in the theories of social
movement and new developments in research.
Prerequisite: Graduate classification.

SOCI 606 War and Democracy
Credits 3.3 Lecture Hours.
Sociological approaches to the study of war’s effects on democracy and
democratic control of the military and the use of force, in comparative-
historical context.

SOCI 607 Seminar in Social Organizations
Credits 3.3 Lecture Hours.
Relevant conceptual and empirical approaches to the study of selected
aspects of social organization. May be taken up to two times for credit as
content varies.
Prerequisite: Graduate classification.

SOCI 608 Social Organization
Credits 3.3 Lecture Hours.
Theoretical and conceptual bases of patterned human behavior; structural,
processual and functional aspects of human groups from simplest informal
to the most complex formal types: small groups, associations, institutions,
complex organizations, bureaucracies, societies.

SOCI 611 Classical Sociological Theory
Credits 3.3 Lecture Hours.
Critical analysis of the writings of the principal founders of modern
sociology; Marx, Durkheim and Weber and their influence on current
theoretical issues.
Prerequisite: SOCI 430 or equivalent or approval of instructor.

SOCI 615 Contemporary Sociological Theory
Credits 3.3 Lecture Hours.
Critical analysis of current sociological perspectives, their logic of inquiry,
substantive claims and application to empirical research.
Prerequisite: SOCI 611.

SOCI 616 Political Sociology
Credits 3.3 Lecture Hours.
Survey of the principal social and organizational bases of politics; the
institutionalization of political power; explanation of political change and
movements of social protest.
Prerequisite: Graduate classification or approval of instructor.

SOCI 617 Comparative Racial-Ethnic Relations
Credits 3.3 Lecture Hours.
Cross-cultural variations in racial-ethnic relations and structures of
inequality; assessment of systems and power-conflict frameworks in
diverse settings such as South America, Mexico, South Africa, Caribbean
Regions and United States.
Prerequisite: Approval of instructor.

SOCI 618 Sociology of Education
Credits 3.3 Lecture Hours.
The school system and the democratic way of life; relationship of
education to social organization, social change and social control. Role of
education in society.
Prerequisite: SOCI 205.

SOCI 621 Social Psychology
Credits 3.3 Lecture Hours.
Personality, social and cultural systems; development and
interrelationships; cognitive activities, motivational determinants and
selectivity; goals, structures, coordination and related factors influencing
complex social groupings.
Prerequisites: SOCI 205; 12 additional hours of social science.

SOCI 622 Social Demography
Credits 3.3 Lecture Hours.
Survey of methods, theories and problems of contemporary demographic
phenomena.
Prerequisite: Approval of department head.

SOCI 623 Measurement of Sociological Parameters
Credits 3.3 Lecture Hours.
Sociological research including scaling, scale analysis and experimental
design.
Prerequisites: Graduate classification; three hours of statistics.

SOCI 624 Qualitative Methodology
Credits 3.3 Lecture Hours.
Exposure to and critical assessment of qualitative approaches to data
gathering in social science; topics include naturalistic observation, field
research skills, unobtrusive measures and grounded theory construction.

SOCI 627 Seminar in Law, Deviance and Social Control
Credits 3.3 Lecture Hours.
Relevant literature and research in selected aspects of law, deviance and
social control. May be taken up to three times for credit as content varies.
Prerequisite: Graduate classification.

SOCI 628 Deviant Behavior
Credits 3.3 Lecture Hours.
Contemporary sociological approaches to deviance; theoretical and
empirical studies of major types of deviant behavior.

SOCI 629 Sociology of Law
Credits 3.3 Lecture Hours.
Critical survey of the social sources of law, the role of law in social
organizations and problems of law enforcement.
Prerequisite: Graduate classification.

SOCI 631 Seminar in Sociological Research
Credits 3.3 Other Hours.
Critical analysis of research procedures used by sociologists.
Prerequisite: SOCI 623.

SOCI 633 Demographic Methods
Credits 3.3 Lecture Hours.
Procedures and techniques for the collection, evaluation and analysis of
demographic data; measures of population growth, composition, fertility,
mortality and migration.
Prerequisite: SOCI 622.

SOCI 635 Sociology of Complex Organizations
Credits 3.3 Lecture Hours.
Comparative structures; contingency models; micro- and macro-theoretical
perspectives.
SOCI 640 Sociology of Development
Credits 3. 3 Lecture Hours.
Survey of sociology of development; review of major classical and contemporary approaches to development including but not limited to modernization theory, world systems theory, comparative nationalism, demographic theories, feminist approaches; contradictions of development including K-Cycles, social movements and ecological constraints. 
Prerequisite: Graduate classification or approval of instructor.

SOCI 647 Seminar in Demography and Human Ecology
Credits 3. 3 Lecture Hours.
Relevant literature and research problems of a selected aspect of demography and human ecology, such as fertility and mortality, migration, international demography. May be taken up to three times for credit as content varies.
Prerequisite: Graduate classification.

SOCI 651 Sociology of Culture
Credits 3. 3 Lecture Hours.
Theoretical developments and methodological issues relevant to studying culture through classical, modern and postmodern sociological perspectives; includes background concerning the conditions under which theories develop and discussion of controversies in the definition of and research agendas within the sociology of culture.
Prerequisite: Graduate classification.

SOCI 657 Seminar in Culture
Credits 3. 3 Lecture Hours.
Relevant literature and research in selected aspects of culture and cultural processes. May be taken up to three times for credit as content varies.
Prerequisite: Approval of instructor.

SOCI 660 Theories of Race and Ethnic Group Relations
Credits 3. 3 Lecture Hours.
Sociological theories of intergroup assimilation, conflict and adaptation; includes examination and analysis of three major contemporary perspectives; assimilation and social fusion theory, conflict models and models of ethnic pluralism; theories of melioration of social discrimination also examined.
Prerequisite: Graduate classification.

SOCI 661/WGST 661 Sociology of Gender
Credits 3. 3 Lecture Hours.
Overview of the Sociology of Gender; historical development, primary concepts, contemporary issues, theory, methods, and applications.
Prerequisite: Graduate classification.
Cross Listing: WGST 661/SOCI 661.

SOCI 662 Racism and Anti-Racism
Credits 3. 3 Lecture Hours.
This seminar focuses on racism and anti-racism issues, including social science research on slavery, anti-Black discrimination and Black resistance, anti-Asian discrimination and Asian American resistance, anti-Latino discrimination and Latino resistance, and white anti-racist groups. We assess empirical research on these topics and explore important theoretical frameworks.
Prerequisite: Graduate classification.

SOCI 663 Black and Latino Americans
Credits 3. 3 Lecture Hours.
This seminar focuses social science theory and research about African Americans and Latinos. We will emphasize historical backgrounds, social science theories applied to these groups, patterns of immigration, cognitive framing, patterns of racial-ethnic discrimination, and racial/class/gender intersections. We will review critically important research books dealing with these and related U.S. racial-ethnic issues.
Prerequisite: Graduate classification.

SOCI 667 Seminar in Race and Ethnic Relations
Credits 3. 3 Lecture Hours.
Origins, extent, consequences of racial and ethnic differences on key demographic variables such as fertility, mortality, migration and population size, growth, distribution and composition; how demographic variables affect and are affected by racial and ethnic differences in family structure, social mobility and socioeconomic stratification. May be taken up to three times for credit as content varies.
Prerequisite: Graduate classification.

SOCI 666 Seminar in Social Psychology
Credits 3. 3 Lecture Hours.
Relevant literature and research problems of a selected aspect of social psychology. May be taken for credit up to three times as content varies.
Prerequisite: Graduate classification.

SOCI 668 Professional Seminar in Sociology
Credit 1. 1 Lecture Hour.
Provides socialization to the profession of sociology; focuses on the role of the graduate student in sociology departments and other areas of professionalization; systematically introduces students to faculty members and their work; and provides instruction on how to write and publish research. Repeatable to 6 hours total.

SOCI 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed individual study of selected problem in field of sociology.
Prerequisite: Approval of instructor.

SOCI 687 Seminar in Rural Sociology
Credits 3. 3 Lecture Hours.
Develop sociological understanding of agriculture and natural resources; includes people involved in production, rural communities and agribusiness; focus on causes of social change and social organizations in agriculture and consequences. May be taken up to three times for credit as content varies.
Prerequisite: Graduate classification.

SOCI 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of sociology. May be repeated for credit.

SOCI 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Initiation and completion of research project of approved scope for an advanced degree.
Prerequisite: Approval of instructor.
SOMS-Schl of Military Sciences

Courses

SOMS 111 Principles of Academic and Personal Development
Credit 1. 1 Lecture Hour.
Identification of personal goals and learning skills promoting academic and career success; development of personal leadership strengths, styles, motivation and values; personal development planning for self-improvement.
Prerequisite: Freshman classification or approval of instructor.

SOMS 180 Survey of Performance Based Training Methods
Credit 1. 1 Lecture Hour.
Introduction to performance oriented training methods and techniques; key concepts and generalizations of training and identification of training needs; study of representative theories of workplace training, performance evaluation, and experiential training techniques.
Prerequisite: Freshman classification or approval of instructor.

SOMS 280 Fundamentals of Peer Leadership
Credit 1. 1 Lecture Hour.
Introduction to theories of peer leadership when applied to a specific context; fundamentals and techniques of small group communication; performance evaluation; survey of basic supervisory skills.
Prerequisite: Sophomore classification or approval of instructor.

SOMS 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of leadership theory and practice. May be repeated for credit.
Prerequisites: Freshman or sophomore classification; approval of instructor.

SOMS 380 Workshop in Leadership Education
Credit 1. 1 Lecture Hour.
The study of leadership theory, intra group relationships, assessment tools for skills development, and techniques for achieving group goals.
Prerequisite: Junior or senior classification; approval of instructor.

SOMS 381 Workshop in Leadership Education II
Credit 1. 1 Lecture Hour.
Continuation of SOMS 380. Fundamentals of small group dynamics; interpersonal communication; application of selected leadership theories; interpretation of individual assessments to include personality traits, values, and signature strengths.
Prerequisites: SOMS 380; junior or senior classification.

SOMS 382 Seminar in Executive Leadership
Credit 1. 1 Lecture Hour.
The study of contemporary leadership issues, organizational effectiveness, problem solving, and decision making.
Prerequisite: Senior classification or approval of instructor.

SOMS 481 Seminar in Executive Leadership II
Credit 1. 1 Lecture Hour.
Continuation of SOMS 481. Discussion of ethical dilemmas in leadership roles; ethical decision-making; personal accountability in organizational settings.
Prerequisite: SOMS 481 or approval of instructor.

SOMS 485 Directed Studies
Credits 1 to 4. 1 to 4 Lecture Hours.
Individual supervision of special readings or assigned projects to promote independent study; program enrichment for capable students; written and oral reports required.
Prerequisite: Approval of instructor.

SOMS 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of leadership theory and practice. May be repeated for credit.
Prerequisites: Junior or senior classification; approval of instructor.

SPAN - Spanish

Courses

SPAN 101 Beginning Spanish I
Credits 4. 3 Lecture Hours. 2 Lab Hours.
(SPAN 1411, 1511) Beginning Spanish I. Elementary language study with oral, written and reading practice. Preparation for conversation. Part of class preparation will be done in language laboratory and online. Students with prior instruction are required to take the Spanish Placement Test before enrolling for the first time in a college Spanish course.

SPAN 102 Beginning Spanish II
Credits 4. 3 Lecture Hours. 2 Lab Hours.
(SPAN 1412, 1512) Beginning Spanish II. Continuation of SPAN 101. Part of class preparation will be done in language laboratory and online. Students with prior instruction are required to take the Spanish Placement Test before enrolling for the first time in a college Spanish course.

SPAN 140 Alternate Beginning Spanish
Credits 4. 4 Lecture Hours. 1 Lab Hour.
Accelerated review of grammatical structures covered in SPAN 101, followed by study of material covered in SPAN 102. Students with prior instruction in Spanish are required to take the Spanish Placement Test before enrolling for the first time in a college Spanish course.

SPAN 201 Intermediate Spanish I
Credits 3. 3 Lecture Hours.
Prerequisite: Placement by examination or transfer credit for SPAN 101 with a grade of C or better.

SPAN 202 Intermediate Spanish II
Credits 3. 3 Lecture Hours.
(SPAN 2312) Intermediate Spanish II. Continuation of SPAN 201 with more advanced material.
Prerequisite: SPAN 201 with a grade of C or better. Students with prior instruction in Spanish are required to take the Spanish Placement Test before enrolling for the first time in a college Spanish course.

SPAN 203 Intermediate Spanish for Heritage Speakers
Credits 3. 3 Lecture Hours.
Study of grammar and continued development of the four skills (writing, reading, speaking, listening) with an emphasis on literacy in a dynamic cultural context centered on Hispanics in the U.S. Conducted in Spanish.
Prerequisites: SPAN 201 with a grade of C or better; students with prior knowledge of Spanish are required to take the Spanish Placement Test before enrolling for the first time in a college Spanish course.
SPAN 221 Field Studies Abroad I
Credits 1 to 6. 1 to 6 Lecture Hours.
Spanish language and culture taught in Spanish in a Spanish-speaking country; participation in academic and cultural activities of a host university or study abroad institute/center; written and oral reports and exams in Spanish.
Prerequisite: SPAN 102 with a grade of B or higher.

SPAN 222 Field Studies Abroad II
Credits 1 to 6. 1 to 6 Lecture Hours.
Spanish language, culture, cultural history, or literature taught in Spanish in a Spanish-speaking country; participation in academic and cultural activities of a host university or study abroad institute/center; written and oral reports and exams in Spanish.
Prerequisite: SPAN 102 with a grade of B or higher.

SPAN 285 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Individual supervision of readings or assigned projects in Spanish, selected for each student individually.
Prerequisite: Approval of instructor and department head.

SPAN 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of Spanish. May be repeated for credit.
Prerequisite: Approval of instructor.

SPAN 302 Advanced Grammar
Credits 3. 3 Lecture Hours.
Study and practice of Spanish grammar, focusing on grammatical features of particular concern to English speakers. Conducted in Spanish.
Prerequisites: SPAN 202, SPAN 203, SPAN 222 or equivalent.

SPAN 303 Composition and Conversation
Credits 3. 3 Lecture Hours.
Development of writing skills in Spanish with emphasis on grammatical constructions; structural analysis of representative texts and their imitation; organization of short compositions and term papers; discussion and conversation over multiple topics; conducted in Spanish.
Prerequisites: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 304 Advanced Grammar for Heritage Speakers
Credits 3. 3 Lecture Hours.
A continuation of SPAN 203. Study of grammar and further development of the four skills (writing, reading, speaking, listening) with an emphasis on literacy in a dynamic cultural context centered on Hispanics in the U.S. Conducted in Spanish.
Prerequisites: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 306 Business Spanish
Credits 3. 3 Lecture Hours.
Continuation of language skill acquisition with advanced material drawn from business and related fields; study of and practice with Spanish business language in the context of Hispanic economic and business systems; conducted in Spanish.
Prerequisite: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 307 Spanish for the Sciences
Credits 3. 3 Lecture Hours.
Development of written and oral scientific communication in Spanish, including listening, speaking, reading and writing, with a focus on general and specialized scientific discourse; field-specific vocabulary and review of structures necessary for academic registers.
Prerequisites: SPAN 202, SPAN 203, or equivalent.

SPAN 310 Oral Expression
Credits 3. 3 Lecture Hours.
Development of oral skills in Spanish through pronunciation practice, discussion of current events, skits, interviews, conversations, role play, impromptu debates and public speaking; conducted in Spanish.
Prerequisite: SPAN 202 or SPAN 203.

SPAN 311 Hispanic Culture and Civilization to the 18th Century
Credits 3. 3 Lecture Hours.
Survey of the Hispanic world with emphasis on its history and cultural patterns from pre-Roman times to the 18th century; description and analysis of artistic, historical, literary, political topics. Taught in Spanish.
Prerequisite: SPAN 202, 203, 222 or approval of instructor.

SPAN 312 Hispanic Culture and Civilization: 18th Century to Present
Credits 3. 3 Lecture Hours.
Overview of the Hispanic world, including the United States, from independence in the Americas to present; description and analysis of artistic, historical, literary, political, sociolinguistic topics. Taught in Spanish.
Prerequisite: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 320 Introduction to Hispanic Literature
Credits 3. 3 Lecture Hours.
Readings in Spanish poetry and prose with emphasis on methods of analysis for imagery, prosody, rhetorical figures, thematic composition and narrative structure; application of those techniques in oral and written reports; required for modern languages majors in Spanish; conducted in Spanish.
Prerequisite: SPAN 202 or SPAN 203 or approval of instructor.

SPAN 331 Spanish Literature to 1700
Credits 3. 3 Lecture Hours.
Origins and evolution of Spanish literature from the Medieval to the Golden Age traditions; epic, drama, novel, picaresque and satire as reflected in works by Berceo, Cervantes, Garcilaso de la Vega, Lope de Vega, Calderón de la Barca and others; conducted in Spanish.
Prerequisites: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 332 Spanish Literature from 1700 to 1936
Credits 3. 3 Lecture Hours.
Representative works of Spanish Neoclassicism, Romanticism, realism, naturalism, modernism, and Avant-Garde movements; overview of historical background, cultural and philosophical tendencies; socio-political movements in modern Spain until the Civil War; conducted in Spanish.
Prerequisites: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 341 Spanish-American Literature from 1492 to 1821
Credits 3. 3 Lecture Hours.
Themes, styles and authors from the meeting of Old and New Worlds through the final days of the Colony; overview of cultural and historical background; conducted in Spanish.
Prerequisites: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 342 Spanish-American Literature from 1821 to 1935
Credits 3. 3 Lecture Hours.
Themes, styles and authors from Independence to Modernity; overview of cultural and historical background; conducted in Spanish.
Prerequisites: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.
SPAN 350 Phonetics
Credits 3.3 Lecture Hours.
Sound system of Spanish with special reference to pronunciation and contrast with sounds of American English; development and description of phonology of principal dialects of American and Peninsular Spanish. Especially for native speakers of English, future teachers of Spanish and bilingual education majors; conducted in Spanish.
Prerequisite: SPAN 202, SPAN 203, SPAN 222 or equivalent.

SPAN 352 Hispanic Linguistics
Credits 3.3 Lecture Hours.
Study of Hispanic linguistics, including phonetics and phonology, morphology, syntax, change and variation.
Prerequisite: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 403 Advanced Writing in Spanish
Credits 3.3 Lecture Hours.
Building on established skills, practice in and reflection on writing in professional, public, academic, and literary genres; evaluation of a variety of models and development of abilities in audience analysis, critical research, review and revision. Taught in Spanish.
Prerequisites: Junior or senior classification and SPAN 303, or approval of instructor.

SPAN 409 Photography in the Hispanic World
Credits 3.3 Lecture Hours.
Study of the work produced by major photographers and/or in different countries in the Hispanic world, from mid-19th century origins of photography to present; theoretical, historical and critical readings; analysis of various genres, modes, and formats. Taught in Spanish.
Prerequisites: Junior or senior classification and SPAN 203 SPAN 222 (p. 982), SPAN 203 SPAN 222, or approval of instructor.

SPAN 410 Hispanic Film
Credits 3.3 Lecture Hours.
Examination of major works and directors of contemporary Hispanic film; interpretation of culture through film; relationship of literature and film; conducted in Spanish.
Prerequisites: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 411 Contemporary Hispanic Society and Culture
Credits 3.3 Lecture Hours.
Cultural, economic, and political aspects of present-day Hispanic societies, and the treatment of these issues in the media; conducted in Spanish.
Prerequisites: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 412 Hispanic Writers in the U.S.
Credits 3.3 Lecture Hours.
Contemporary literature by monolingual/bilingual Hispanic authors in the United States; analysis of representative works from major Hispanic communities in the United States; conducted in Spanish.
Prerequisites: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 413 Hispanic Culture through Art
Credits 3.3 Lecture Hours.
Examination of the works of a major artist and/or artistic movement as a vehicle for intensive analysis of elements of Hispanic culture; study of artists such as El Greco, Velazquez, Goya, Picasso, Dali, and Diego Rivera. Conducted in Spanish.
Prerequisites: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 421 Spanish Language Poetry
Credits 3.3 Lecture Hours.
Development of Spanish lyric poetry from the Jarchas to the present; analysis of metrics, imagery, language and style in the different periods; may include poems by Berceo, Garcilaso de la Vega, Góngora, Sor Juana, Bécquer, Rosalía, Dario, Machado, Lorca, Neruda, Vallejo, Paz and others; course conducted in Spanish.
Prerequisites: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 445 Cervantes
Credits 3.3 Lecture Hours.
Analysis of Cervantes' life, cultural milieu and works; emphasis on Don Quixote, its significance in Spanish literature and in the development of the modern novel; conducted in Spanish.
Prerequisites: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 450 Contemporary Spanish and Spanish-American Literature
Credits 3.3 Lecture Hours.
Representative works of authors from both sides of the Atlantic; similarities and differences as regional literature give way to cosmopolitan styles, themes and movements; conducted in Spanish.
Prerequisites: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 452 Hispanic Sociolinguistics
Credits 3.3 Lecture Hours.
Exploration of language varieties and language use in different social contexts within the Hispanic society; introduction to the theoretical foundations of sociolinguistic variation. Taught in Spanish.
Prerequisites: Junior or senior classification; SPAN 352 or approval of instructor.

SPAN 461 Topics in Hispanic Culture
Credits 3.3 Lecture Hours.
Exploration of significant topics, author, movement, genre or period in Hispanic literature. May be taken three times for credit.
Prerequisite: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 462 Topics in Hispanic Linguistics
Credits 3.3 Lecture Hours.
Exploration of significant socio-cultural issues or the sociocultural influences derived from or exerted on expressive forms within Hispanic Society. May be taken three times for credit.
Prerequisites: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 466 Topics in Hispanic Linguistics
Credits 3.3 Lecture Hours.
Exploration of significant topics in Hispanic linguistics from different theoretical and applied perspectives. May be taken three times for credit.
Prerequisites: SPAN 202, SPAN 203, SPAN 222 or approval of instructor.

SPAN 484 Internship
Credits 3.3 Lecture Hours.
Directed internship in a Spanish-speaking public or private organization to provide students with on-the-job training or applied research experience appropriate to career objectives. Must be taken satisfactory/unsatisfactory. May be taken two times for credit.
Prerequisites: Approval of department head; junior or senior classification.
SPED 485 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Individual supervision of readings or assigned projects selected for each student individually; written and oral reports.
Prerequisite: Approval of instructor and department head.

SPED 489 Special Topics in... Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of Spanish. May be repeated for credit.
Prerequisite: Approval of department head.

SPED 491 Research Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in hispanic studies. May be repeated 2 times for credit.
Prerequisites: Junior or senior classification and approval of instructor.

SPED - Special Education

Courses

SPED 291 Research Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of faculty member in special education. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

SPED 302 Instructional Design for Students with Disabilities Credits 3. 3 Lecture Hours.
Familiarizes pre-service teachers with research associated with effective teaching; designing and implementing of instruction for students including those with mild to moderate disabilities; designing and managing environments and materials.
Prerequisites: INST 210; junior classification.

SPED 302 Instructional Strategies for Students with Disabilities Credits 3. 3 Lecture Hours.
Research-based strategies and techniques in teaching students who are at-risk academically or students with disabilities in a variety of general and special education settings; addresses teaching of academics, teacher strategies for engagement and incorporating the use of technology.
Prerequisite: Admission to professional phase of program.

SPED 311 Assessment of Students with Disabilities Credits 3. 3 Lecture Hours.
Instruction in formal and informal assessment techniques used with students with disabilities, including progress monitoring; development of Individualized Educational Program plans and the IEP process.
Prerequisite: Admission to professional phase of program.

SPED 311 Effective Mathematics Strategies for Students with Disabilities Credits 3. 3 Lecture Hours.
Information and competencies through instruction in effective mathematics instruction for students P-12 with academic learning problems and/or disabilities; effective instruction design and teaching techniques, implementation of research-based methods relevant for active authentic learning; considers state and national standards related to teaching and learning mathematics.
Prerequisites: Admission to professional phase of program.

SPED 414 Methods and Issues in Low-Incidence Disabilities Credits 3. 3 Lecture Hours.
Overview of learning and behavioral characteristics of individuals with low-incidence disabilities such as intellectual disability, autism, physical disabilities, traumatic brain injury, sensory impairments, and multiple disabilities; research-based practices in assessment and education and designing educational environments that facilitate active participation, self-advocacy and independence.
Prerequisites: Admission to professional phase of program.

SPED 442 Teaching Students with Emotional Disturbances and Behavior Disorders Credits 3. 3 Lecture Hours.
Research-based techniques and materials used in the instruction of students who have emotional and behavioral disorders across a variety of classroom and other educational environments; includes identification and assessment issues, placements, family involvement, and historical and legal issues.
Prerequisites: Admission to professional phase of program.

SPED 471 Classroom Management and Behavioral Interventions Credits 3. 3 Lecture Hours.
Effective management of classrooms; includes research-based models of classroom discipline, proactive strategies that prevent misbehavior, interventions that decrease problem behaviors, and management systems appropriate for students with disabilities.
Prerequisites: Admission to professional phase of program.

SPED 491 Research Credits 0 to 4. 0 to 4 Lecture Hours.
Research conducted under the direction of faculty member in special education. May be repeated 2 times for credit.
Prerequisites: Junior or senior classification and approval of instructor.

SPED 601 Assessment in School Settings Credits 3. 3 Lecture Hours.
Formal and informal assessment; state assessment and alternatives; techniques used with students with disabilities; using data to make educational decisions.
Prerequisite: Graduate classification; approval of department head; approval of instructor.

SPED 602 Ethics and Professional Conduct in Special Education and Applied Behavior Analysis Credits 3. 3 Lecture Hours.
Focus on ethical and professional conduct required for special educators and behavior analysts; information required for certified behavior analysts; ethics required by the Behavior Analyst Certification Board; highly relevant for those working with children or adults with disabilities in any capacity.
Prerequisite(s): approval of department head; graduate classification.
SPED 603 Foundations of Special Education  
Credits 3.3 Lecture Hours.  
Build a knowledge base to understand the historical and conceptual foundations of special education; familiarization with special education literature; overview of current issues and trends impacting special education.  
Prerequisites: Graduate classification or approval of instructor; approval of department head.

SPED 609 Educating Individuals with Autism Spectrum Disorders  
Credits 3.3 Lecture Hours.  
Study of the incidence, prevalence, and characteristics of individuals with autism spectrum disorders, particularly for teachers, counselors, and related fields; research and best practices in assessment, treatment, and education; includes treatment of social, communication, academic, and behavior deficits with emphasis on behavior analysis.  
Prerequisite: Graduate classification.

SPED 610 Special Education and the Family  
Credits 3.3 Lecture Hours.  
Overview of issues in special education interpreted within the context of the family; relationships among the school, the families, and the community; impact of relationships on service provisions; field experiences working with families with special needs.  
Prerequisite: Approval of department head.

SPED 611 Multicultural Special Education  
Credits 3.3 Lecture Hours.  
Multicultural perspectives in special education; foundations of multicultural special education; cultural responsive teaching; methods for teaching culturally and linguistically diverse learners in special education.  
Prerequisite: Graduate classification.

SPED 612 Special Education Law and Policy  
Credits 3.7 Lab Hours.  
Legal development of the discipline of special education; current requirements for providing free and appropriate education to students with disabilities; assessment and performance of research with legal information.  
Prerequisites: Graduate classification and approval of department head.

SPED 614 Issues in Moderate and Severe Disabilities  
Credits 3.3 Lecture Hours.  
Psychological, social, physical and cognitive aspects of moderate to severe disabilities; service delivery systems; biomedical issues community programming; transition programming; adult service program; programs for the elderly; all in relation to individuals with moderate to severe disabilities.  
Prerequisites: Graduate classification and approval of department head.

SPED 615 Special Education Assessment: Technical and Legal Aspects  
Credits 3.3 Lecture Hours.  
Teaches skills to critically examine assessment tools and procedures in special education; technical and legal issues in pre-referral evaluation, eligibility assessment, IEP writing and program evaluation; emphasizes test validity and test sensitivity to growth; mastery of knowledge base and realistic scenarios.  
Prerequisites: Graduate classification or approval of instructor; approval of department head.

SPED 617 Adolescent Literacy for Students with Diverse Instructional Needs  
Credits 3.3 Lecture Hours.  
Research-based strategies to teach reading and writing to 4th through 12th grade students with disabilities and other diverse instructional needs; emphasis on current issues, assessment, motivation, intervention, and content area issues and strategies.  
Prerequisite: Graduate classification.

SPED 618 Induction and Preparation for the Special Education Professoriate  
Credits 3.3 Lecture Hours.  
Orientation to full-time doctoral studies; understanding historical and contemporary issues in the field of special education; familiarization with special education literature and systematic reviews of research literature.  
Prerequisite: Admission into special education doctoral program.

SPED 619 Critical Research and Practice Issues in Special Education  
Credits 3.3 Lecture Hours.  
Examination of the historical, conceptual/theoretical and empirical basis of special education research and practice; understanding special education as a field and specific areas for in-depth knowledge.  
Prerequisite: Approval of department head.

SPED 620 Bilingual Special Education  
Credits 3.3 Lecture Hours.  
Topics concerning bilingual special education will be covered including history of the field; language acquisition and assessment; general assessment, individual education plans (IEPs); curriculum development; mainstreaming; consultation services; and parental involvement.  
Prerequisite: Approval of department head.

SPED 621 Overview of Exceptional Students  
Credits 3.3 Lecture Hours.  
Overview of historical foundations for special education practice; definitions of disabilities, relevant educational characteristics of students with disabilities; assessment procedures associated with the identification of students’ disabilities; intervention procedures related to education of students with disabilities.  
Prerequisites: Graduate classification and approval of department head.

SPED 623 Self-Determination and Advocacy  
Credits 3.3 Lecture Hours.  
Conceptualization and theoretical framework of self-determination for students with disabilities; the role of self-determination in improving student outcomes; and best practices in promoting self-determination among students with disabilities.  
Prerequisites: Graduate classification.

SPED 624 Professional Development in Research  
Credits 3.3 Lecture Hours.  
Development and refinement of skills needed to be productive scholars with particular focus on disseminating research through manuscript preparation and conference presentations.  
Prerequisites: SPED 618; SPED 619; Graduate classification; approval of department head.

SPED 628 Consultation in Special Education  
Credits 3.3 Lecture Hours.  
Rationale, strategies, procedures and resources for providing consultation as systematic problem-solving to school procedures, and resources for improving services for children with disabilities, and those who are at-risk of school failure.  
Prerequisites: Graduate classification and approval of department head.
SPED 630 Early Literacy for Students with Diverse Instructional Needs
Credits 3.3 Lecture Hours.
Research-based strategies to teach beginning reading and writing to pre-K through 4th grade students with disabilities and other diverse instructional needs; emphasis on current issues, assessment, prevention, and intervention.
Prerequisite: Graduate classification.

SPED 632 Transition from School to Work
Credits 3.3 Lecture Hours.
Current issues and practices related to the transition of students from school to work; partnerships with business and industry; secondary and postsecondary education linkages; work-based training.
Prerequisite: Approval of department head.

SPED 641 Low-Incidence Instruction for Individuals with Significant Support Needs
Credits 3.3 Lecture Hours.
Examination of how particular types of low-incidence disabilities; including mental retardation, autism, physical disabilities, traumatic brain injury, deafness, blindness, multiple disabilities, and other health impairments, affect academic and job performance. Current methods for teaching individuals with low-incidence disabilities, including an overview of Adaptive/Assistive Technology (AT) solutions.
Prerequisites: Graduate classification and approval of department head.

SPED 642 Program Development for Students with Behavior Problems
Credits 3.3 Lecture Hours.
Field-based course relating to effective management of challenging and severe behavior problems in the classroom using proactive strategies; effective instruction and planned behavioral interventions; methods for observing, assessing and analyzing challenging and severe behaviors; includes a 20-hour field based component.
Prerequisites: Graduate classification and approval of department head.

SPED 683 Field Practicum
Credits 1 to 15.1 to 15 Other Hours.
Faculty supervised experience in professional practice settings in Special Education. May be repeated for credit.
Prerequisite: Approval of instructor and department head.

SPED 684 Professional Internship.
Credits 1 to 6.1 to 6 Other Hours.
Supervised experience in professional functions appropriate to career goals in special education.
Prerequisite: Approval of instructor and department head.

SPED 685 Directed Studies
Credits 1 to 6.1 to 6 Other Hours.
Directed individual study of selected problems in special education.
Prerequisite: Approval of instructor and department head.

SPED 689 Special Topics in...
Credits 1 to 4.1 to 4 Lecture Hours.
Selected topics in an identified area of special education. May be repeated for credit.
Prerequisite: Approval of department head.

SPED 699 Advanced Applied Behavior Analysis
Credits 3.3 Lecture Hours.
Rigorous repertoire of knowledge and skill in behavior analysis; comprehensive and contemporary description of applied behavior analysis; application of principles and paradigms of theoretical and experimental aspects of behavior.
Prerequisites: SEFB 618 and graduate classification.

SPMT - Sport Management

Courses

SPMT 217 Foundations of Sport Management
Credits 3.3 Lecture Hours.
History, principles, and objectives of the sport management profession; an overview of the structure of the sport industry; introduction to the scope and variety of career opportunities in sport.

SPMT 220 Olympic Studies
Credits 3.3 Lecture Hours.
History of the Olympic Games and their development over time; analyze, compare and contrast the relationship between the Olympics, cultures and societies; examination of central problems, accomplishments and collaborations revolving around the Olympics from a variety of viewpoints.

SPMT 225 Practical Skills for Sport Professionals
Credits 3.3 Lecture Hours.
Introduction to the writing, communication and technical skills required to succeed in the sport industry; segmented into units based on different professions within the sport industry such as journalism, marketing, technology, public relations, organizational communication and law.

SPMT 285 Directed Studies
Credits 0 to 4.0 to 4 Other Hours.
Work on a specified topic with the intent of promoting independent reading, research and study; supplement existing course offerings or subjects not presently covered. May be repeated for credit.
Prerequisites: Freshman or sophomore classification; approval of instructor.

SPMT 289 Special Topics in...
Credits 0 to 4.0 to 4 Lecture Hours.
Special Topics in... Selected topics in an identified area of sport management. May be repeated for credit.

SPMT 291 Research
Credits 0 to 4.0 to 4 Other Hours.
Research conducted under the direction of a faculty member in sport management. May be repeated 4 times for credit.
Prerequisites: Freshman or sophomore classification; approval of instructor.

SPMT 304 Sport Psychology Management and Practice
Credits 3.3 Lecture Hours.
The relationship of psychology to sport and exercise; topics include history, application of learning principles, social psychology, personality variables, psychological assessment, youth sport, and diversity issues in sport and exercise.
Prerequisite: Junior classification.
SPMT 319/SOCI 319 Sociology of Sport
Credits 3.3 Lecture Hours.
Social institution of sport and its consequences for American society; social organization from play to professional sport; violence, discrimination, women in sport; socialization implications from participation in sports.
Prerequisite: Junior or senior classification.
Cross Listing: SOCI 319/SPMT 319.

SPMT 333 Sport Management
Credits 3.3 Lecture Hours.
Introduction to techniques for proper management of programs in physical activities and athletics including the basic physical education instructional program, intercollegiate and interscholastic athletics, intramural and club programs, and alternative athletic programs such as health clubs, corporate fitness centers and YMCA/YWCAs.
Prerequisites: Junior or senior classification; admission to professional phase of program.

SPMT 334 Sport Communication
Credits 3.3 Lecture Hours.
(3-0) Communications from the interorganizational level to mass media specific within the unique setting of sport industry.
Prerequisites: Junior or senior classification; sport management majors only or approval of instructor.

SPMT 336 Diversity in Sport Organizations
Credits 3.3 Lecture Hours.
Examine an encompassing perspective of diversity within North American and international sport organizations.
Prerequisite: Junior or senior classification.

SPMT 337 International Sport Business
Credits 3.3 Lecture Hours.
The magnitude of global expansion and development of sport familiarity with major firms and organizations on the global scene, major issues in global sports; emphasis on business opportunities available internationally; underlying thesis focuses on the contrasts from the U.S. sport industry to foreign markets.
Prerequisite: Junior or senior classification.

SPMT 340 Sport Governance
Credits 3.3 Lecture Hours.
Governance and policy development in sport management; managerial activities related to governance, strategic management, ethics in sport, governance and policy development in specific sport contexts.
Prerequisite: Junior or senior classification.

SPMT 402 Pre-Internship Field Experiences
Credit 1.2 Lab Hours.
Orientation, observations and experiences in preparation for professional internships.
Prerequisites: Senior classification; approved acceptance to field experience.

SPMT 420 Sports Facility Planning
Credits 3.3 Lecture Hours.
Examination of the principles involved in planning and managing sports and recreational facilities.
Prerequisites: Junior or senior classification; admission to professional phase of program or approval of instructor for non-sport management majors.

SPMT 421 Legal Aspects of Sport
Credits 3.3 Lecture Hours.
Explores the relationship between sport and law, and the fundamentals of law used by sport managers, including contract law, tort law, Constitutional issues, employment and discrimination law, the effect of state and federal statutes on recreational activities and sport, and current legal issues in sports.
Prerequisites: Junior or senior classification; admission to professional phase of program or approval of instructor for non-sport management majors.

SPMT 422 Financing Sport Operations
Credits 3.3 Lecture Hours.
Study of financial theories and practical application as they impact sport revenues and expenditures; familiarization with current issues and trends in financing sport organizations.
Prerequisites: Junior or senior classification; admission to professional phase of program.

SPMT 423 Marketing Aspects of Sport
Credits 3.3 Lecture Hours.
Investigation of the rapidly developing sports industry from a marketing perspective; familiarization of marketing terms and tools needed in the sports industry; introduction to the various aspects of marketing that make up the marketing plan.
Prerequisites: Junior or senior classification; admission to professional phase of program.

SPMT 450 Professional Practice in Sport Management
Credits 3.3 Lecture Hours.
Information, perspectives and skills to promote the management of sports in the community, school, workplace and sport business settings; boundary-crossing partnerships across sport disciplines; the role of collaborative efforts to improve the needs of the sport community.
Prerequisite: Admission to professional phase of program; senior classification.

SPMT 482 Seminar
Credit 1.1 Lecture Hour.
Acquaint students with current research and the research process in their chosen field of study (sport management). May be taken 4 times for credit.
Prerequisites: Admission to professional phase of program or approval of instructor; junior or senior classification.

SPMT 483 Practicum in Sport Management
Credits 3.3 Lecture Hours.
Participation and study in sport management and administration; acquisition and practice of professional and/or clinical skills in sport management. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisites: Admission to professional phase of program; approval of instructor; junior or senior classification.

SPMT 484 Internship in Sport Management
Credits 0 to 12.0 to 12 Other Hours.
Supervised internship with sport management organizations; acquisition and practice of professional and/or clinical skills in sport management.
Prerequisites: SPMT 402; completion of all coursework.

SPMT 485 Directed Studies
Credits 0 to 4.0 to 4 Other Hours.
Special problems in sport management assigned to individual students or to groups. May be repeated for credit. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisites: Junior or senior classification; approval of instructor.
SPMT 489 Special Topics in...
Credits 0 to 4. 0 to 4 Lecture Hours.
Special Topics in... Selected topics in an identified area of sport management. May be repeated for credit.

SPMT 491 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of a faculty member in sport management. May be repeated 4 times for credit. 
Prerequisites: Junior or senior classification; approval of instructor.

SPMT 601 Research Methods for Sport Organizations
Credits 3. 3 Lecture Hours.
Methodology and application of social science research in sport organizations; including the research process, research designs, sampling procedures, measurement, survey research, hypothesis testing, application and interpretation of appropriate statistics, and the research presentation.

SPMT 610 Administration of Sport Organizations
Credits 3. 3 Lecture Hours.
Issues related to the administration of sport and fitness organizations; includes interschool athletics and corporate organizations.

SPMT 611 Revenue Generation in Sport
Credits 3. 3 Lecture Hours.
Examine the basic financial, accounting, and revenue generation principles central to the management of sport organizations.
Prerequisites: Graduate classification.

SPMT 612 Personnel Management in Sport
Credits 3. 3 Lecture Hours.
Examine the service orientation of sport organizations, individual differences in employees and clients, personnel management practices, and expected outcomes of effective personnel management.
Prerequisite: Graduate classification.

SPMT 613 Diversity in Sport Organizations
Credits 3. 3 Lecture Hours.
Examines an encompassing perspective of diversity within North American and international sport organizations; analysis and understanding of the various ways that people within sport organizations can differ; treats issues of the non-dominant, historically under-represented elements of U.S. society with an emphasis placed on racial and gender issues.
Prerequisite: Graduate classification.

SPMT 615 Sport Marketing
Credits 3. 3 Lecture Hours.
Explores and examines the elements of planning, organizing and prompting sporting events.
Prerequisite: Graduate classification.

SPMT 623 Athletics Administration
Credits 3. 3 Lecture Hours.
Principles and processes of managing intercollegiate athletic organizations and properties.
Prerequisite: Graduate classification.

SPMT 655 Sport Law
Credits 3. 3 Lecture Hours.
Legal principles affecting sponsors and users of sports programs; liability concepts in tort, contract, civil rights and property law in program planning, development, marketing and management.
Prerequisite: Graduate classification or approval of instructor.

SPMT 661 Seminar
Credit 1. 1 Lecture Hour.
Reports and discussions of research and the research process in sport management. May be taken 4 times for credit.
Prerequisite: Graduate classification.

SPMT 682 Seminar in...
Credit 1. 1 Lecture Hour.
Discussions of current topics and issues impacting sport management and administration. May be taken 8 times for credit.
Prerequisite: Graduate classification.

SPMT 683 Practicum in Sport Management
Credits 3. 3 Lecture Hours.
Participation and study in sport management and administration; acquisition and practice of professional and/or clinical skills in sport management.
Prerequisites: Graduate classification and approval of instructor.

SPMT 684 Internship in Sport Management
Credits 1 to 6. 1 to 6 Lecture Hours.
Supervised internship with sport management organization; application of formal training to performing professional functions consistent with career goals.
Prerequisites: Graduate classification; approval of instructor.

SPMT 685 Directed Studies
Credits 1 to 12. 1 to 12 Lecture Hours.
Directed study of special problems in sport management not related to thesis. May be repeated for credit.
Prerequisites: Graduate classification; approval of instructor; approval of department head.

SPMT 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Special Topics in ... Selected topics in an identified area of sport management. May be repeated for credit.
Prerequisite: Graduate classification.

SPMT 690 Theory of Research in Sport Management
Credits 3. 3 Lecture Hours.
Theory and design of research problems and experiments in various fields of sport management. May be taken 2 times for credit.
Prerequisite: Graduate classification.

SPMT 691 Research
Credits 1 to 18. 1 to 18 Other Hours.
Research for thesis or dissertation.
Prerequisites: Graduate classification and approval of committee chair.

SPSC - Spatial Sciences

Courses

SPSC 102 Introduction to Spatial Sciences
Credit 1. 1 Lecture Hour.
Provides an understanding of spatial sciences; how it is applied for problem solving in a wide variety of fields; and survey of the field and what opportunities are available to professionals in spatial sciences.
SPSC 461/AGSM 461 Geographic Information Systems for Resource Management
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Geographic Information System (GIS) approach to the integration of spatial and attribute data to study the capture, analysis, manipulation and portrayal of natural resource data; examination of data types/formats, as well as the integration of GIS with remote sensing and Global Positioning System; laboratory includes extensive use of GIS applications to conduct analyses of topics in natural resources.
Prerequisite: Approval of instructor.
Cross Listing: AGSM 461/SPSC 461.

STAT - Statistics

Courses

STAT 201 Elementary Statistical Inference
Credits 3. 3 Lecture Hours.
(MATH 1342, 1442) Elementary Statistical Inference. Data collection, tabulation and presentation; elementary description of the tools of statistical inference; probability, sampling and hypothesis testing; applications of statistical techniques to practical problems. May not be taken for credit after or concurrently with any other course in statistics or SCMT 303.

STAT 211 Principles of Statistics I
Credits 3. 3 Lecture Hours.
Introduction to probability and probability distributions; sampling and descriptive measures; inference and hypothesis testing; linear regression, analysis of variance.
Prerequisite: MATH 152 or MATH 172.

STAT 212 Principles of Statistics II
Credits 3. 3 Lecture Hours.
Design of experiments, model building, multiple regression, nonparametric techniques and contingency tables.
Prerequisite: STAT 211.

STAT 301 Introduction to Biometry
Credits 3. 3 Lecture Hours.
Intended for students in animal sciences. Introduces fundamental concepts of biometry including measures of location and variation, probability, tests of significance, regression, correlation and analysis of variance which are used in advanced courses and are being widely applied to animal-oriented industry.
Prerequisite: MATH 141 or MATH 166 or equivalent.

STAT 302 Statistical Methods
Credits 3. 3 Lecture Hours.
Intended for undergraduates in the biological sciences. Introduction to concepts of random sampling and statistical inference; estimation and testing hypotheses of means and variances; analysis of variance; regression analysis; chi-square tests.
Prerequisite: MATH 141 or MATH 166 or equivalent.

STAT 303 Statistical Methods
Credits 3. 3 Lecture Hours.
Intended for undergraduates in the social sciences. Introduction to concepts of random sampling and statistical inference, estimation and testing hypotheses of means and variances, analysis of variance, regression analysis, chi-square tests.
Prerequisite: MATH 141 or MATH 166 or equivalent.

STAT 307 Sample Survey Techniques
Credits 3. 3 Lecture Hours.
Concepts of population and sample; the organization of a sample survey; questionnaire design. Basic survey designs and computation of estimates and variances.
Prerequisite: STAT 301 or STAT 302 or STAT 303 or SCMT 303.

STAT 407 Principles of Sample Surveys
Credits 3. 3 Lecture Hours.
Principles of sample surveys and survey design; techniques for variance reduction; simple, stratified and multi-stage sampling; ratio and regression estimates; post-stratification; equal and unequal probability sampling.
Prerequisite: STAT 212.

STAT 408 Introduction to Linear Models
Credits 3. 3 Lecture Hours.
Introduction to the formulation of linear models and the estimation of the parameters of such models, with primary emphasis on least squares. Application to multiple regression and curve fitting.
Prerequisites: STAT 212; MATH 304.

STAT 414 Mathematical Statistics I
Credits 3. 3 Lecture Hours.
Introduction to the mathematical theory of statistics, including random variables and their distributions, expectation and variance, point estimation, confidence intervals and hypothesis testing.
Prerequisite: STAT 212; MATH 221, MATH 251 or MATH 253.

STAT 415 Mathematical Statistics II
Credits 3. 3 Lecture Hours.
Continuation of the mathematical theory of statistics, including sampling and limiting distributions, principles for statistical inference and inference for bivariate and categorical data.
Prerequisite: STAT 414.

STAT 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Special problems in statistics not covered by another course in the curriculum. Work may be in either theory or methodology.
Prerequisite: Approval of instructor.

STAT 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Special Topics in... Selected topics in an identified area of statistics. May be repeated for credit.
Prerequisite: Junior or senior classification or approval of department head.

STAT 491 Research
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Research conducted under the direction of faculty members in statistics. May be taken four times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisite: Junior or senior classification or approval of instructor.

STAT 601 Statistical Analysis
Credits 4. 3 Lecture Hours. 2 Lab Hours.
For students in engineering, physical and mathematical sciences. Introduction to probability, probability distributions and statistical inference; hypotheses testing; introduction to methods of analysis such as tests of independence, regression, analysis of variance with some consideration of planned experimentation.
Prerequisite: MATH 152 or MATH 172.
STAT 604 Topics in Statistical Computations
Credits 3.3 Lecture Hours.
Efficient uses of existing statistical computer programs (SAS, R, etc.); generation of random numbers; using and creating functions and subroutines; statistical graphics; programming of simulation studies; and data management issues.
Prerequisite: MATH 221, MATH 251, or MATH 253.

STAT 605 Advanced Statistical Computations
Credits 3.3 Lecture Hours.
Programming languages, statistical software and computing environments; development of programming skills using modern methodologies; data extraction and code management; interfacing lower-level languages with data analysis software; simulation; MC integration; MC-MC procedures; permutation tests; bootstrapping.
Prerequisite: STAT 612 and STAT 648.

STAT 607 Sampling
Credits 3.3 Lecture Hours.
Planning, execution and analysis of sampling from finite populations; simple, stratified, multistage and systematic sampling; ratio estimates.
Prerequisite: STAT 601 or STAT 652 or concurrent enrollment in STAT 641.

STAT 608 Regression Analysis
Credits 3.3 Lecture Hours.
Multiple, curvilinear, nonlinear, robust, logistic and principal components regression analysis; regression diagnostics, transformations, analysis of covariance.
Prerequisite: STAT 601 or STAT 641.

STAT 610 Theory of Statistics - Distribution Theory
Credits 3.3 Lecture Hours.
Brief introduction to probability theory; distributions and expectations of random variables, transformations of random variables and order statistics; generating functions and basic limit concepts.
Prerequisite: MATH 409 or concurrent enrollment in MATH 409.

STAT 611 Theory of Statistics - Inference
Credits 3.3 Lecture Hours.
Theory of estimation and hypothesis testing; point estimation, interval estimation, sufficient statistics, decision theory, most powerful tests, likelihood ratio tests, chi-square tests.
Prerequisite: STAT 610 or equivalent.

STAT 612 Theory of Linear Models
Credits 3.3 Lecture Hours.
Matrix algebra for statisticians; Gauss-Markov theorem; estimability; estimation subject to linear restrictions; multivariate normal distribution; distribution of quadratic forms; inferences for linear models; theory of multiple regression and AOV; random- and mixed-effects models.
Prerequisite: Course in linear algebra.

STAT 613 Statistical Methodology I
Credits 3.3 Lecture Hours.
Elements of likelihood inference; exponential family models; group transformation models; survival data; missing data; estimation and hypotheses testing; nonlinear regression models; conditional and marginal inferences; complex models-Markov chains, Markov random fields, time series, and point processes.
Prerequisite: STAT 612.

STAT 614 Probability for Statistics
Credits 3.3 Lecture Hours.
Probability and measures; expectation and integrals, Kolmogorov's extension theorem; Fubini's theorem; inequalities; uniform integrability; conditional expectation; laws of large numbers; central limit theorems
Prerequisite: STAT 610 or its equivalent.

STAT 615 Stochastic Processes
Credits 3.3 Lecture Hours.
Survey of the theory of stochastic processes; includes countable-state Markov processes, birth-death processes, Poisson point processes, renewal processes, Brownian motion and diffusion processes and covariance-stationary processes; theoretical development and applications to real world problems.
Prerequisites: STAT 610; MATH 409.

STAT 616 Statistical Aspects of Machine Learning I: Classical Multivariate Methods
Credits 3.3 Lecture Hours.
Core methods from traditional multivariate analysis and various extensions; probability distributions of random vectors and matrices, multivariate normal distributions, model assessment and selection in multiple regression, multivariate regression, dimension reduction, linear discriminant analysis, logistic discriminant analysis, cluster analysis, multidimensional scaling and distance geometry, and correspondence analysis.
Prerequisites: STAT 612, STAT 613.

STAT 618 Statistical Aspects of Machine Learning II: Modern Techniques
Credits 3.3 Lecture Hours.
Second course in statistical machine learning; recursive partition and tree-based methods, artificial neural networks, support vector machines, reproducing kernels, committee machines, latent variable methods, component analysis, nonlinear dimensionality reduction and manifold learning, matrix factorization and matrix completion, statistical analysis of tensors and multi-indexed data.
Prerequisites: STAT 612, STAT 613, and STAT 616.

STAT 620 Asymptotic Statistics
Credits 3.3 Lecture Hours.
Review of basic concepts and important convergence theorems; elements of decision theory; delta method; Bahadur representation theorem; asymptotic distribution of MLE and the LRT statistics; asymptotic efficiency; limit theory for U-statistics and differential statistical functionals with illustrations from M.-L.-R-estimation; multiple testing.
Prerequisite: STAT 614.

STAT 621 Advanced Stochastic Processes
Credits 3.3 Lecture Hours.
Conditional expectation; stopping times; discrete Markov processes; birth-death processes; queueing models; discrete semi-Markov processes; Brownian motion; diffusion processes, Ito integrals, theorem and limit distributions; differential statistical functions and their limit distributions; M.-L.-R-estimation.
Prerequisite: STAT 614 or STAT 615.

STAT 623 Statistical Methods for Chemistry
Credits 3.3 Lecture Hours.
Chemometrics topics of process optimization, precision and accuracy; curve fitting; chi-squared tests; multivariate calibration; errors in calibration standards; statistics of instrumentation.
Prerequisite: STAT 601, STAT 641 or STAT 652 or approval of instructor.
STAT 626 Methods in Time Series Analysis
Credits 3.3 Lecture Hours.
Introduction to statistical time series analysis; autocorrelation and spectral characteristics of univariate, autoregressive, moving average models; identification, estimation and forecasting.
Prerequisite: STAT 601 or STAT 642 or approval of instructor.

STAT 627 Nonparametric Function Estimation
Credits 3.3 Lecture Hours.
Nonparametric function estimation; kernel, local polynomials, Fourier series and spline methods; automated smoothing methods including cross-validation; large sample distributional properties of estimators; recent advances in function estimation.
Prerequisite: STAT 611.

STAT 630 Overview of Mathematical Statistics
Credits 3.3 Lecture Hours.
Basic probability theory including distributions of random variables and expectations. Introduction to the theory of statistical inference from the likelihood point of view including maximum likelihood estimation, confidence intervals, and likelihood ratio tests. Introduction to Bayesian methods.
Prerequisites: MATH 221, MATH 251, and MATH 253.

STAT 631 Statistical Methods in Finance
Credits 3.3 Lecture Hours.
Regression and the capital asset pricing model, statistics for portfolio analysis, resampling, time series models, volatility models, option pricing and Monte Carlo methods, copulas, extreme value theory, value at risk, spline smoothing of term structure.
Prerequisites: STAT 610, STAT 611, STAT 608.

STAT 632 Statistical Methodology II-Bayesian Modeling and Inference
Credits 3.3 Lecture Hours.
Decision theory; fundamentals of Bayesian inference; single and multi-parameter models; Gaussian model; linear and generalized linear models; Bayesian computations; asymptotic methods; non-iterative MC; MCMC; hierarchical models; nonlinear models; random effect models; survival analysis; spatial models.
Prerequisite: STAT 613.

STAT 633 Advanced Bayesian Modeling and Computation
Credits 3.3 Lecture Hours.
Bayesian methods in their research; methodology; and applications of Bayesian methods in bioinformatics, biostatistics, signal processing, machine learning, and related fields.
Prerequisite: STAT 608, STAT 613, STAT 632.

STAT 636 Applied Multivariate Analysis
Credits 3.3 Lecture Hours.
Multivariate extension of the chi-square and t-tests, discrimination and classification procedures; applications to diagnostic problems in biological, medical, anthropological and social research; multivariate analysis of variance, principal component and factor analysis, canonical correlations.
Prerequisites: MATH 304, STAT 608.

STAT 638 Introduction to Applied Bayesian Methods
Credits 3.3 Lecture Hours.
Uncertainty regarding parameters and how they can be explicitly described as a posterior distribution which blends information from a sampling model and prior distribution; emphasis on modeling and computations under the Bayesian paradigm; includes prior distributions, Bayes Theorem, conjugate and non-conjugate models, posterior simulation via the Gibbs sampler and MCMC, hierarchical modeling.
Prerequisites: STAT 604, STAT 608, STAT 630.

STAT 641 The Methods of Statistics I
Credits 3.3 Lecture Hours.
An application of the various disciplines in statistics to data analysis, introduction to statistical software; demonstration of interplay between probability models and statistical inference.
Prerequisite: Concurrent enrollment in STAT 610 or approval of instructor.

STAT 642 The Methods of Statistics II
Credits 3.3 Lecture Hours.
Design and analysis of experiments; scientific method; graphical displays; analysis of nonconventional designs and experiments involving categorical data.
Prerequisite: STAT 641.

STAT 643 Biostatistics I
Credits 3.3 Lecture Hours.
Bio-assay for quantiative and quantal responses: statistical analysis of contingency, including effect estimates, matched samples and misclassification.
Prerequisites: STAT 608, STAT 630, and STAT 642 or STAT 610.

STAT 644 Biostatistics II
Credits 3.3 Lecture Hours.
Generalized linear models; survival analysis with emphasis on nonparametric models and methods.
Prerequisite: STAT 643 or approval of instructor.

STAT 645 Applied Biostatistics and Data Analysis
Credits 3.3 Lecture Hours.
Survey of crucial topics in biostatistics; application of regression in biostatistics; analysis of correlated data; logistic and Poisson regression for binary or count data; survival analysis for censored outcomes; design and analysis of clinical trials; sample size calculation by simulation; bootstrap techniques for assessing statistical significance; data analysis using R.
Prerequisites: STAT 651, STAT 652, and STAT 659, or equivalent or prior approval of instructor.

STAT 646 Statistical Bioinformatics
Credits 3.3 Lecture Hours.
An overview of relevant biological concepts and technologies of genomic/proteomic applications; methods to handle, visualize, analyze, and interpret genomic/proteomic data; exploratory data analysis for genomic/proteomic data; data preprocessing and normalization; hypotheses testing; classification and prediction techniques for using genomic/proteomic data to predict disease status.
Prerequisites: STAT 604, STAT 651, STAT 652 or prior approval of instructor.

STAT 647 Spatial Statistics
Credits 3.3 Lecture Hours.
Spatial correlation and its effects; spatial prediction (kriging); spatial regression; analysis of point patterns (tests for randomness and modelling patterns); subsampling methods for spatial data.
Prerequisite: STAT 601 or STAT 611 or equivalent.

STAT 648 Applied Statistics and Data Analysis
Credits 3.3 Lecture Hours.
Background to conduct research in the development of new methodology in applied statistics. Topics covered will include: exploratory data analysis; sampling; testing; smoothing; classification; time series; and spatial data analysis.
Prerequisite: Approval of instructor.
STAT 651 Statistics in Research I
Credits 3.3 Lecture Hours.
For graduate students in other disciplines; non-calculus exposition of the concepts, methods and usage of statistical data analysis; T-tests, analysis of variance and linear regression.
Prerequisite: MATH 102 or equivalent.

STAT 652 Statistics in Research II
Credits 3.3 Lecture Hours.
Continuation of STAT 651. Concepts of experimental design, individual treatment comparisons, randomized blocks and factorial experiments, multiple regression, Chi-squared tests and a brief introduction to covariance, non-parametric methods and sample surveys.
Prerequisite: STAT 651.

STAT 653 Statistics in Research III
Credits 3.3 Lecture Hours.
Advanced topics in ANOVA; analysis of covariance and regression analysis including analysis of messy data; non-linear regression; logistic and weighted regression; diagnostics and model building; emphasis on concepts; computing and interpretation.
Prerequisite: STAT 652.

STAT 656 Applied Analytics Using SAS Enterprise Miner
Credits 3.3 Lecture Hours.
Introduction to data mining and will demonstrate the procedures: Optimal prediction decisions; comparing and deploying predictive models; neural networks; constructing and adjusting tree models; the construction and evaluation of multi-stage models.
Prerequisite: STAT 657, STAT 659.

STAT 657 Advanced Programming Using SAS
Credits 3.3 Lecture Hours.
Programming with SAS/IML, programming in SAS Data step, advanced use of various SAS procedures.
Prerequisites: STAT 604 and STAT 642.

STAT 658 Transportation Statistics
Credits 3.3 Lecture Hours.
Design of experiments, estimation, hypothesis testing, modeling, and data mining for transportation specialists.
Prerequisite: STAT 211 or STAT 651.

STAT 659 Applied Categorical Data Analysis
Credits 3.3 Lecture Hours.
Introduction to analysis and interpretation of categorical data using ANOVA, regression analogs; includes contingency tables, loglinear models, logistic regression; use of computer software such as SAS, GLIM, SPSSX.
Prerequisite: STAT 601, STAT 641 or STAT 652 or equivalent.

STAT 661 Statistical Genetics I
Credits 3.3 Lecture Hours.
Basic concepts in human genetics, sampling designs, gene frequency estimation, Hardy-Weinberg equilibrium, linkage disequilibrium, association and transmission disequilibrium test studies, linkage and pedigree analysis, segregation analysis, polygenic models, DNA sequence analysis.
Prerequisites: STAT 610 and STAT 611.

STAT 667 Statistics for Advanced Placement Teachers
Credits 1 to 3.1 to 3 Lecture Hours.
Review of the fundamental concepts and techniques of statistics; topics included in Advanced Placement Statistics; exploring data, planning surveys and experiments, exploring models, statistical inference.
Prerequisite: Approval of instructor.

STAT 673 Time Series Analysis I
Credits 3.3 Lecture Hours.
Introduction to diverse modes of analysis now available to solve for univariate time series; basic problems of parameter estimation, spectral analysis, forecasting and model identification.
Prerequisite: STAT 611 or equivalent.

STAT 674 Time Series Analysis II
Credits 3.3 Lecture Hours.
Continuation of STAT 673. Multiple time series, ARMA models, test of hypotheses, estimation of spectral density matrix, transfer function and forecasting.
Prerequisites: STAT 673.

STAT 681 Seminar
Credit 1.1 Lecture Hour.
Oral presentations of special topics and current research in statistics. May be repeated for credit.
Prerequisite: Graduate classification in statistics.

STAT 684 Professional Internship
Credits 1 to 3.1 to 3 Other Hours.
Practicum in statistical consulting for students in PhD program. Students will be assigned consulting problems brought to the Department of Statistics by researchers in other disciplines.
Prerequisite: STAT 642 or its equivalent.

STAT 685 Directed Studies
Credits 1 to 6.1 to 6 Other Hours.
Individual instruction in selected fields in statistics; investigation of special topics not within scope of thesis research and not covered by other formal courses.
Prerequisites: Graduate classification and approval of department head.

STAT 689 Special Topics in...
Credits 1 to 4.1 to 4 Lecture Hours.
Selected topics in an identified area of statistics. Open to non-majors. May be repeated for credit.
Prerequisite: Approval of instructor.

STAT 691 Research
Credits 1 to 23.1 to 23 Other Hours.
Research for thesis or dissertation.
Prerequisite: Graduate classification.

STLC - Student Learning Center

Courses

STLC 001 Basic Mathematical Skills
Credits 1 to 3.1 to 3 Lecture Hours.
Developmental instruction in mathematics; includes the integers and rational numbers and applications, exponents, polynomials, solution of equations, graphing, elementary geometry and reasoning skills. May not be used for credit toward a degree.

STLC 002 Basic Writing Skills
Credits 1 to 3.1 to 3 Lecture Hours.
Individualized instruction in English composition based on an analysis of the student's proofreading, revision and editing skills; a programmed sequence of study and practice designed for improvement of writing performance through mastery of basic skills at word, sentence, paragraph and multiparagraph levels. May not be used for credit toward a degree.
STLC 003 Basic Reading Skills
Credits 1 to 3. 1 to 3 Lecture Hours.
Individualized instruction in reading based on an analysis of the student's reading comprehension skills; study and practice of reading strategies designed to increase reading comprehension skills. May not be used for credit toward a degree.

STLC 101 Application of Learning Theories to College Studies
Credits 2. 2 Lecture Hours.
The study of critical theories of learning with application to academic performance; designated as the university's learning framework course, this course is designed to help students understand learning theory and develop strategies for successful completion of college level studies.

STLC 102 Career Awareness
Credits 2. 2 Lecture Hours.
Encourages planning career and life goals early in academic career for timely decision-making related to academics, acquiring marketable skills, pursuing relevant experiential education, and participating in student/professional organizations; acquaints students with realities of early career, emphasizes utilization of resources on a timely basis for competitiveness in job market.

STLC 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 1 to 4 Lab Hours.
Selected topics in academic development and improvement.
Prerequisite: Approval of coordinator.

TCMG - Technology Management

Courses

TCMG 272 Technology and End-User Support
Credits 3. 3 Lecture Hours.
Upgrading, setup, configuration, troubleshooting of computer systems; development of skills to work with end-users; technology needs assessment; escalation and defusing strategies; service learning and community engagement.
Prerequisite: Sophomore classification.

TCMG 274 Distance Networking for Training and Development
Credits 3. 3 Lecture Hours.
Development of knowledge towards application of telecommunication networking in public education and corporate training settings; technical alternatives for delivery of subject matter for educators and trainers.
Prerequisites: Sophomore classification and approval of instructor.

TCMG 285 Directed Studies
Credits 0 to 12. 0 to 12 Lecture Hours.
Directed readings or research problems in industrial technology.

TCMG 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of industrial technology. May be repeated for credit.

TCMG 291 Research
Credits 0 to 4. 0 to 4 Lecture Hours.
Research conducted under the direction of faculty member in technology management. May be repeated 3 times for credit.
Prerequisites: Junior or sophomore classification and approval of instructor.

TCMG 303 Unix System Administration Practices
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Development and system administration of the Unix operating system; technical alternatives for proactive and reactive maintenance of system health.
Prerequisites: TCMG 272 and TCMG 274 with a grade of C or better; junior or senior classification or approval of instructor.

TCMG 308 Security and Ethics in the Digital World
Credits 3. 3 Lecture Hours.
Introduction to cybersecurity; analysis of threats and risks from the environment; development of appropriate strategies to mitigate impact; ethics of extraordinary administrative access; ethics of digital forensics and implications to society.
Prerequisites: TCMG 272 and TCMG 274 with a grade of C or better; junior or senior classification or approval of instructor.

TCMG 316 Database Systems Administration and Application
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Database administration and application use techniques; database structures, modeling, configuration, development, security, topologies and access; focus on system administration of Unix-based database systems.
Prerequisite: TCMG 303 with a grade of C or better.

TCMG 402 Instructional Technology and Design
Credits 3. 3 Lecture Hours.
Design principles; development of instruction; contemporary issues and trends; foundations in learning research; requirements for instruction, task and needs analysis; learning situations and instructional models; hardware and software innovations; assessing instructional outcomes; factors affecting utilization.
Prerequisites: EHRD 371 with a grade of C or better; junior or senior classification or approval of instructor.

TCMG 412 Contemporary Issues in Technology Management
Credits 3. 3 Lecture Hours.
Specific innovation or practices nascent to the professional information technology industry; discovery of practical applications and analytics of new innovation.
Prerequisites: TCMG 272 and TCMG 274 with a grade of C or better; junior or senior classification.

TCMG 476 Managing Technical Networks
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Development of knowledge and skills towards the application of technical network management in public education and corporate training settings; focus on practices, techniques and tools for managers of technical networks.
Prerequisites: TCMG 272 and TCMG 274 with a grade of C or better; junior or senior classification.

TCMG 484 Professional Internship
Credits 6. 6 Other Hours.
Directed internship in an organization to provide students with a learning experience supervised by professionals in organizational settings appropriate to the student's professional objectives; must be in good standing with the University.
Prerequisites: EHRD 481 and EHRD 490 with a grade of C or better; approval of instructor.

TCMG 485 Research
Credits 0 to 12. 0 to 12 Other Hours.
Directed Studies. Directed readings or research problems in industrial technology.
Prerequisites: Junior or senior classification; approval of directed studies application.
TEED - Teacher Education

Courses

TEED 302 Teaching/Learning Processes: Psychological Perspectives on Education
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Psychological perspectives on instruction; examines learning processes, learner motivation, home and cultural influences, learning strategies; design and delivery of instruction; controversies regarding learning and instruction.
Prerequisites: Junior classification; admission to teacher education.

TEED 425 Supervised Clinical Teaching
Credits 12. 36 Other Hours.
Supervised Student Teaching. Culmination of teacher education program; integrate and apply knowledge and skills learned from program of study while observing and participating in accredited schools with university supervision. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisites: Admission and retention in teacher education program; successful completion of all coursework.

TEED 602 Contemporary Perspectives on Education
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Current issues in American public education concerning sociological, curricular, political and legal perspectives.
Prerequisite: Admission to Post-Baccalaureate Teacher Certification Program.

TEED 649 Instructional Strategies in Academic Specialties in Middle and Senior HS: Principles & Applications
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Instructional Strategies in Academic Specialties in Middle and Senior High School: Principles and Applications. Relation of information processing models to theory and practice of planning, delivering and evaluating instruction in public school settings. Subject matter and generic competencies required for teacher certification in Texas.

TEED 662 Seminar
Credits 3. 2 Lecture Hours.
Reports of research, discussions and analysis of problems and issues in teaching/learning with first year of teaching in public schools. May be repeated for credit.
Prerequisites: TEED 602 and TEED 649.

TEED 684 Professional Internship
Credits 3 to 9. 3 to 27 Other Hours.
Supervised experiences in performing professional functions in classroom settings.
Prerequisite: Approval of program coordinator.

Courses

TEFB 273 Introduction to Culture, Community, Society and Schools
Credits 3. 2 Lecture Hours. 3 Other Hours.
Field-based course that introduces the culture of schooling and classrooms for analysis within the lens of language, gender, racial, socio-economic, ethnic and academic diversity; the family as a partner in education and educational equality discussed.

TEFB 322 Teaching and Schooling in Modern Society
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Development, structure, management and finance of secondary schools; historical, philosophical, ethical and moral dimensions of teaching; role of school in a democratic society; teaching as a profession.
Prerequisite: Junior or senior classification.

TEFB 323 Teaching Skills I
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Study and development of teaching skills necessary for reflective problem solving, managing classroom learning environments, motivating students to learn, and making ethical decisions; emphasis given to models and theories of human behavior, informal and formal data collection techniques, and diversity of learners. Phase III of the secondary program.
Prerequisites: Successful completion of TEFB 322; admission to teacher education.

TEFB 324 Teaching Skills II
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Study and development of teaching skills necessary for applying instructional strategies; teaching general strategies, assessing student learning, and analyzing and synthesizing multiple source data; emphasis given to adolescent development and cultures and to teacher and child cultures.
Prerequisites: Successful completion or concurrent enrollment in TEFB 322; junior or senior classification.

TEFB 371 Dynamics and Management in Multicultural/Inclusionary Learning Environments
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Field-based course focusing on communication, methodology and management perspectives that lead to democratic classrooms; organizational structures that focus on transformative, inclusionary learning; interventions for students with disabilities; analysis of systemic conditions placing children from diverse backgrounds and representing diverse abilities in positions of "risk" for incomplete success in school.
Prerequisites: Junior classification; admission to teacher education; concurrent enrollment in EDCI 454.

TEFB 401 Language Arts in the Middle and Senior School
Credits 3. 2 Lecture Hours. 6 Lab Hours.
Methodology of teaching language arts-related content with specific reference to language, literature, journalism, drama and speech interactions among these areas; development of oral competence; coordination with other subjects. Phase IV, Practicum I.
Prerequisites: Completion of Phases I, II and III of the secondary program; admission to teacher education; enrollment in language arts-related teaching field.

TEFB 404 Social Studies in the Middle and Senior High School
Credits 3. 2 Lecture Hours. 6 Lab Hours.
Features of social studies instruction in grades 6-12; approaches, methods and instructional materials. Phase IV, Practicum I.
Prerequisites: Completion of Phases I, II and III of the secondary program; admission to teacher education; enrollment in history and/or social science teaching field.
TEFB 406 Science in the Middle and Secondary School
Credits 3. 2 Lecture Hours. 6 Lab Hours.
Methods course for the prospective secondary teacher in the physical and biological sciences; implementation of contemporary curricula. Phase IV, Practicum I.
Prerequisites: Completion of Phases I, II and III of the secondary program; admission to teacher education; enrollment in science-related teaching field.

TEFB 407 Mathematics in the Middle and Senior School
Credits 3. 2 Lecture Hours. 6 Lab Hours.
Design and teach selected topics from middle and secondary school mathematics. Content, materials and methodology. Phase IV, Practicum I.
Prerequisites: Completion of Phases I, II and III secondary program; admission to teacher education; enrollment in mathematics teaching field.

TEFB 410 Social Studies and the Humanities in the Elementary School
Credits 3. 2 Lecture Hours. 6 Lab Hours.
Recent trends, issues and procedures related to curriculum development and instruction in the social studies and humanities; integration of content, planning, design of appropriate teaching/learning experiences and evaluation; preparation of prototype materials.
Prerequisites: Admission to teacher education; concurrent enrollment in RDNG 467, TEFB 412 and TEFB 413.

TEFB 412 Mathematics in the Elementary School
Credits 3. 2 Lecture Hours. 6 Lab Hours.
Introduction to understanding of modern mathematics; integration of content, history and application of discovering techniques using problem solving approach; developing an understanding of four fundamental procedures--structure, measurement, sets, fractions--and communication of important mathematical concepts to elementary children.
Prerequisites: MATH 365 and MATH 366; admission to teacher education; concurrent enrollment in RDNG 467, TEFB 410 and TEFB 413.

TEFB 413 Science in the Elementary School
Credits 3. 2 Lecture Hours. 6 Lab Hours.
Designed to help elementary teachers understand basic concepts of science and scientific methods; content relates to natural phenomena involving physical, chemical and biological processes; elementary students appreciation and interest in science.
Prerequisites: TEFB 273; admission to teacher education; concurrent enrollment in RDNG 467, TEFB 410 and TEFB 412 required.

TEFB 423 Supervised Student Teaching
Credits 3. 12 Other Hours.
Observation and participation in an accredited public school classroom; techniques of teaching student's teaching fields, and appropriate instructional strategies for assigned student population in fulfillment of endorsement requirements. May be repeated for credit. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisites: Admission to teacher education program and to student teaching.

TEFB 426 Supervised Clinical Teaching
Credits 6. 24 Other Hours.
Culmination of teacher education program; integrate and apply knowledge and skills learned from program of study while observing and participating in accredited schools with university supervision. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisites: Admission and retention in teacher education program; successful completion of all coursework.

TEFB 429 Supervised Clinical Teaching
Credits 9. 36 Other Hours.
Culmination of teacher education program; integrate and apply knowledge and skills learned from program of study while observing and participating in accredited schools with university supervision. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisites: Admission and retention in teacher education program; successful completion of all coursework.

TEFB 484 Internship
Credits 5. 40 Other Hours.
Directed internship in a public school classroom.
Prerequisites: Senior classification; TEFB 483.

TEFB 499 TEACHING METHODS CLASSES
Credits 15. 39 Lecture Hours.

THAR - Theatre Arts

Courses

THAR 101 Introduction to Western Theatre and Drama
Credits 3. 2 Lecture Hours. 3 Lab Hours.
(DRAM 1310) Introduction to Western Theatre and Drama. Survey of the styles and genres of dramatic literature, theatrical production and tasks of the actor, director and designer.

THAR 102 Script Analysis
Credits 3. 3 Lecture Hours.
Introduction in analyzing dramatic structure as represented in European and American plays; focus on the art of the playwright.

THAR 110 Acting I: Fundamentals
Credits 3. 2 Lecture Hours. 4 Lab Hours.
(DRAM 1351) Acting I: Fundamentals. A Stanislavsky-based approach to the fundamentals of acting, which may include sensory exercises, relaxation, concentration, imagination, improvisation, character analysis and scene work.

THAR 115 Voice and Articulation
Credits 3. 3 Lecture Hours.
(SPCH 1342, 2336) Voice and Articulation. Voice mechanism and use of phonetic alphabet to determine sound placement and production for speech and voice improvement. Analysis and practice of relaxation, pitch, rate, resonance, quality, and volume through class exercise and performance.

THAR 135 Theatre Technology I
Credits 3. 2 Lecture Hours. 4 Lab Hours.
(DRAM 1330) Theatre Technology I. Survey of theatre performance spaces, basic tools and set construction, basic scenic, lighting, sound and properties design and construction; participation on departmental production crews required.

THAR 155 History of Western Dress
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Evolution of dress in Western civilization; consideration of influences of politics, religion, economics, visual arts and social mores on choices of dress.

THAR 156 Dress, Culture and Society
Credits 3. 3 Lecture Hours.
Relationship of dress to humans as biological, aesthetic and social beings; dress as cultural performance.
THAR 201 Introduction to World Theatre
Credits 3. 3 Lecture Hours.
Non-Western theatre, its origins and continuing influence on society and Western theater; emphasis on the theaters of India, China, Japan, Africa, the Caribbean and Latin America.

THAR 210 Acting II: Characterization
Credits 3. 2 Lecture Hours. 4 Lab Hours.
(DRAM 1352) Acting II: Characterization. Continuation of THAR 110; intermediate course which focuses on improvisation, voice, movement, scene study, ensemble, with emphasis on character development and analysis.
Prerequisite: THAR 110. Majors and minors only or approval of instructor.

THAR 245 Basic Theatrical Design
Credits 3. 3 Lecture Hours.
Elements and principles of design for the theatre; role of the designer within the production team, theoretical and practical applications in the visual interpretation of plays; participation in departmental productions.

THAR 250 Stage Makeup
Credits 3. 2 Lecture Hours. 4 Lab Hours.
(DRAM 1341) Stage Makeup. An analytical approach to the visualization of characters focusing on research and design, application techniques and media.
Prerequisites: THAR 102, THAR 110 or approval of instructor.

THAR 255 Costume Technology I
Credits 3. 2 Lecture Hours. 4 Lab Hours.
(DRAM 1342) Costume Technology I. Survey of the costume process from concept to realization; basic hand and sewing machine techniques; basic patterning and fitting methods; and crafts techniques; participation on departmental production crews required.

THAR 280 History of the Theatre I
Credits 3. 3 Lecture Hours.
(DRAM 2361) History of the Theatre I. Survey of the history of Western theatre from primitive times to the closing of the theatres in England in 1642. For non-theatre majors and minors only.

THAR 281 History of the Theatre II
Credits 3. 3 Lecture Hours.
(DRAM 2362) History of the Theatre II. Survey of the history of Western theatre from the closing of the theatres in England in 1642 to the present; brief introduction to the theatre of the East. For non-theatre majors and minors only.

THAR 282 American Theatre
Credits 3. 3 Lecture Hours.
Surveys American theatrical production and drama from colonial times to the present; focus on various theatre artists and movements which have shaped, and been shaped by, American culture.

THAR 285 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Individual study of identified topics in the theatre for specific needs of theatre arts majors; formal report required.
Prerequisites: Six hours of theatre arts and approval of instructor and department head; THAR majors and minors only.

THAR 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of theatre production, technology, history or criticism. May be repeated for credit.

THAR 290 Theatre Practicum: Crew
Credit 1. 4 Other Hours.
(DRAM 1120, 1121, 1220, 1221, 1320, 1321, 2120, 2121, 2220) Theatre Practicum: Crew. Participation in the run crew for a departmental theatre production under supervision of theatre arts faculty; audition or application may be required. May be taken two times for credit.

THAR 301 Performance in World Cultures
Credits 3. 3 Lecture Hours.
Application of the tools of performance studies to explore the enactment of the arts in world cultures and the ways the people of every society express themselves in performance; examination of different genres of performance through music, theatre, verbal art and dress.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: MUSC 301 and PERF 301.

THAR 302 Dramaturgy
Credits 3. 3 Lecture Hours.
Exploration of literary, production and theoretical dramaturgy in a classroom setting; script analysis, theatre criticism, theories of theatre, research techniques and dramaturgy in the production process, advancing thought about the art form in all its complexity; research methods for theatre.
Prerequisites: THAR 102; majors and minors only or approval of instructor.

THAR 308 Stage Management and Arts Administration
Credits 3. 3 Lecture Hours.
Planning and managing artistic events and performances; basic concepts of management theories, creating budgets, stage and production management, and grant applications; attendance of departmental events required.
Prerequisite: Approval of instructor.

THAR 310 Acting III: Period Styles
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Exploration of acting techniques associated with various periods and non-realistic styles of theatre; scene work emphasized.
Prerequisites: THAR 110 and THAR 210 or approval of instructor.

THAR 328/MUSC 328 Japanese Traditional Performing Arts
Credits 3. 3 Lecture Hours.
Study of various genres of Japanese performing arts from the 7th century to the present; understanding the genres in their historical and cultural contexts and recognizing shared aesthetic values.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: MUSC 328/THAR 328.

THAR 335 Theatre Technology II
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Planning, design and execution of scenic, lighting, sound and properties design construction; participation in departmental crews required. May be repeated once for credit.
Prerequisites: THAR 135; participation in departmental productions.

THAR 345 Scene Design
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Drafting techniques as applied to scenic design; scenic construction techniques; design projects to include perspective rendering, ground plans, elevations, working drawings and models.
Prerequisites: THAR 102, THAR 135 and THAR 245, or approval of the instructor.
THAR 355 Costume Design
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Role and responsibilities of costume designer; design projects to include rendering techniques, stylistic choices and alternative analytical approaches.
Prerequisites: THAR 102, THAR 245, or approval of instructor.

THAR 360 Lighting Design
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Basic electricity; theatre lighting instrumentation and maintenance; color theory and color media; stage lighting theory and technique; preparation of light plot, instrumentation schedule and cue sheets; operation of lighting equipment; laboratory practice and participation on departmental productions crews is required.
Prerequisites: THAR 102, THAR 135 and THAR 245, or approval of instructor.

THAR 381 Theatre History and Dramatic Literature I
Credits 3. 3 Lecture Hours.
Survey of the history of theatre and drama from ancient times to c. 1700; examination of the evolution of theatre and drama from primitive rituals to highly stylized writing and performance in Europe and Asia.
Prerequisites: THAR 102; majors and minors only; junior or senior classification.

THAR 382 Theatre History and Dramatic Literature II
Credits 3. 3 Lecture Hours.
Continuation of THAR 381. Survey of the history of theatre and drama from 1700 to the present; examines the evolution of theatre and drama in Africa, the Americas, Asia and Europe.
Prerequisites: THAR 381; majors and minors only; junior or senior classification.

THAR 386/MUSC 386 Evolution of the American Musical
Credits 3. 3 Lecture Hours.
Examination of the American musical from its heterogeneous origins to a thriving and diverse expression of the human condition; analysis and critical discourse on the development of the American musical through text, audio and visual recordings.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: MUSC 386/THAR 386.

THAR 390 Theatre Practicum: Performance
Credit 1. 4 Other Hours.
Participation as a performer in a departmental theatre production under supervision of theatre arts faculty; audition or application may be required. May be taken two times for credit.
Prerequisite: Junior or senior classification or approval of instructor.

THAR 391 Theatre Practicum: Production
Credit 1. 4 Other Hours.
Participation in the production team for a departmental theatre production under supervision of theatre arts faculty; audition or application may be required. May be taken two times for credit.
Prerequisite: Junior or senior classification or approval of instructor.

THAR 392 Theatre Practicum: Design
Credit 1. 4 Other Hours.
Participation in the design team for a departmental theatre production under supervision of theatre arts faculty; audition or application may be required. May be taken two times for credit.
Prerequisite: Junior or senior classification or approval of instructor.

THAR 407 Performing Literature.
Credits 3. 3 Lecture Hours.
Analysis and performance of poetry, prose and drama; emphasis on translating analytical decisions into performance; solo performance, readers theatre, chamber theatre, and technology in/as performance.
Prerequisite: Junior or senior classification.

THAR 410 Acting IV - Advanced Problems in Acting
Credits 3. 3 Lecture Hours.
Solving advanced dramatic problems using acting, voice, movement, and style techniques; writing, development and performance of an autobiographical monologue; includes audition preparation and rehearsal techniques.
Prerequisites: THAR 310; junior or senior classification.

THAR 420 Directing
Credits 3. 2 Lecture Hours. 4 Lab Hours.
Theatre forms and styles; director's function and responsibility in producing plays; script analysis; directing laboratory scenes; participation in departmental productions.
Prerequisites: THAR 102, THAR 110, THAR 245, THAR 381, or approval of instructor.

THAR 435 New Technology for Designers
Credits 3. 3 Lecture Hours.
Fundamentals of design software including sound editing, video editing, and rendering for theatre; multi-media installation.
Prerequisites: PEFR 202 or THAR 135; THAR 245; junior or senior classification; or approval of instructor.

THAR 445 Design as Performance
Credits 3. 3 Lecture Hours.
Design as performance using research methods and the production of new work; disciplines of design, performance, installation and performance as research.
Prerequisites: THAR 245 and junior or senior classification; or approval of instructor.

THAR 482 Topics in American Theatre and Performance
Credits 3. 3 Lecture Hours.
Exploration of significant issues in American theatre and performance; emphasis on the aesthetic, social, and cultural issues affecting theatre and performance. May be taken two times for credit.
Prerequisites: THAR 102 and THAR 382 or approval of instructor; junior or senior classification.

THAR 485 Directed Studies
Credits 0 to 3. 0 to 3 Other Hours.
I, II, S Advanced individual study of identified topics in theatre for specific needs of theatre arts majors; formal report required. May be repeated for credit up to 6 hours.
Prerequisites: 24 hours of theatre arts; THAR majors and minors only or permission of instructor.

THAR 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of theatre production, technology, history, or criticism. May be repeated for credit.
Prerequisite: Approval of instructor.

THAR 491 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the direction of a faculty member in theatre arts. May be taken up to two times for credit.
Prerequisites: Junior or senior classification and approval of instructor.
UGST - Undergraduate Studies

Courses

UGST 181 First Year Seminar
Credits 0 to 3. 0 to 3 Lecture Hours.
Seminar on various contemporary topics; introduction to high quality college instruction and research; focus on writing, speaking, discussion and research; open to all majors; restricted to first-time-in-college students and limited in size to provide small class experience. May be taken two times for credit.

UGST 182 Topics in Undergraduate Studies
Credits 0 to 3. 0 to 3 Lecture Hours.
Selected interdisciplinary topics related to specific programs as identified by the office of undergraduate studies; for students in approved first year programs. May be taken two times for credit.
Prerequisite: Freshman classification or approval of instructor.

UGST 285 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Directed individual study on selected topics in undergraduate studies. May be taken six times for credit.

UGST 484 Internship
Credits 0 to 3. 0 to 3 Other Hours.
Directed internship in a community, public or private organization to provide students with on-the-job training and/or applied research experience appropriate to career objectives. May be taken three times for credit.
Prerequisites: Junior or senior classification and approval of instructor.

UGST 485 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Directed individual study on selected topics in undergraduate studies. May be taken six times for credit.

UGST 491 Research
Credits 0 to 4. 0 to 4 Other Hours.
Research conducted under the direction of a faculty member in undergraduate studies. May be taken three times for credit.
Prerequisites: Junior or senior classification and approval of instructor.

UGST 492 Cooperative Education in Public Policy
Credits 0 to 3. 0 to 3 Lecture Hours.
Educational work assignment in public policy setting related to student’s career interest and course of study; supervision of the student will be by the cooperating employer and the instructor; reports, approved by course instructor, will be required. May be taken two times for credit.
Prerequisites: Junior or senior classification and participation in Public Policy Internship Program.

URPN - Urban & Reg Planning

Courses

URPN 201 The Evolving City
Credits 3. 3 Lecture Hours.
Introduction to the history of contemporary urban and regional planning and how the evolving forms of cities and regions pose opportunities and/or challenges for planners; understanding key social, economic, political and technological forces that shape city form and function and its ramification for urban and regional planning.

URPN 202 Building Better Cities
Credits 3. 3 Lecture Hours.
Determinants of land use patterns; classification of uses; idealized conceptual alternatives; location and size criteria; mapping; comprehensive planning process, relationship to circulation planning.

URPN 210 Urban Analytical Methods I
Credits 3. 3 Lecture Hours.
Study of various analytical techniques used in urban and regional decision making; quantitative approaches to analyze and manipulate data; utilization of statistical packages for data, analysis and communication to enhance urban planning modeling.
Prerequisite: URPN majors only or approval of instructor.

URPN 220 Digital Communication I
Credits 3. 3 Lecture Hours.
Applications of computer graphics, rendering, and visualization software in urban design, landscape architecture, and environmental analysis; introduction to basic concepts and principles of graphic composition; rendering, visualization, and linkages to landscape-referenced data.
Prerequisite: Landscape Architecture and Urban Planning majors only or approval of instructor.

URPN 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in landscape architecture and urban planning. May be taken 2 times for credit.
Prerequisites: Freshman or sophomore classification.

URPN 301 Urban Analytical Methods II
Credits 3. 3 Lecture Hours.
Focuses on research conducted by planners, sociologists, anthropologists, political scientists and a variety of applied social scientists; examines variety of procedures employed when conducting research in urban areas; furthers understanding and knowledge of statistical methods employed in social research and elements of geographical analysis.
Prerequisite: Upper division College of Architecture; URPN 210 or approval of instructor, URPN majors only.

URPN 302 Planning Law
Credits 3. 3 Lecture Hours.
Familiarization with the fundamental principles of planning law and legislation; legal foundation for the urban planning process; alternative methods of plan implementation; emphasis on legal issues as they impact land use planning and development at the municipal level of government; participation in mock advocacy trials and public hearings.
Prerequisites: URPN 301; URPN majors only.

URPN 310 Urban Analytical Methods II
Credits 3. 3 Lecture Hours.
Focuses on research conducted by planners, sociologists, anthropologists, political scientists and a variety of applied social scientists; examines variety of procedures employed when conducting research in urban areas; furthers understanding and knowledge of statistical methods employed in social research and elements of geographical analysis.
Prerequisite: Upper division College of Architecture; URPN 210 or approval of instructor, URPN majors only.

URPN 320 Digital Communication II
Credits 3. 3 Lecture Hours.
Advanced applications of computer graphics, rendering, and visualization software in urban design, landscape architecture, and environmental analysis; introduction to basic concepts and principles of graphic composition, rendering, visualization, and linkages to landscape-referenced data.
Prerequisites: URPN 220; department majors only.
URPN 325 Introduction to GIS in Urban and Regional Planning
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Provides an understanding of GIS fundamentals; basic concepts, principles and functions; essential skills for applying GIS in various fields such as urban planning, landscape architecture, land development, environmental studies, transportation and hazard management; based on learning through class projects.
Prerequisite: Upper division College of Architecture; department majors only or approval of instructor.

URPN 326 Advanced GIS in Urban and Regional Planning
Credits 3. 3 Lecture Hours.
Advanced instruction in applications of spatial tools for urban planning, landscape architecture, land development, hazard management, and related problems; GIS applications through review of literature and practice; data quality, uncertainty, the integration of GPS, remote sensing and information technology within the context of urban and regional planning.
Prerequisite: URPN 325 or approval of instructor, department majors only.

URPN 330 Land Development I
Credits 3. 3 Lecture Hours.
Interface between the physical and financial dimensions in design and development to achieve building and project economies; creating a physical product and a financial venture that are responsive to social and environmental concerns and to market economy and finance.
Prerequisite: Department majors only or approval of instructor.

URPN 331 Public and Private Infrastructure Funding
Credits 3. 3 Lecture Hours.
An introduction to issues of financing public and public-private development project; exploring the difference between raising revenue, including the trade offs associated with establishing a sustainable tax base, and raising capital through capital markets; illustration of the range of decisions with financing public and public-private partnerships.
Prerequisite: Department majors only or approval of instructor.

URPN 340 Housing and Community
Credits 3. 3 Lecture Hours.
Housing, its development, planning, marketing, designing, financing and production; social and design history and contemporary issues of American housing development, urban renewal, neighborhood structure and community facilities.
Prerequisite: Department majors and minors only or approval of instructor.

URPN 360 Issues in Environmental Quality
Credits 3. 3 Lecture Hours.
Issues in environmental quality; focus on stormwater and ecosystem qualities influenced by land development; and planning principles and techniques (e.g. low impact development) for sustainable stormwater management in urban and suburban watersheds.
Prerequisite: Junior or senior classification or approval of instructor.

URPN 361 Urban Issues
Credits 3. 3 Lecture Hours.
Issues pertaining to the evolution and development of cities and urban regions; examines the socio-economic, cultural and physical development of urban areas; addresses contemporary problems such as racial tension, unemployment and poverty, housing, pollution and environmental sustainability, traffic and congestion, land use, crime, public health, and other quality of life issues.
Prerequisite: Junior or senior classification or approval of instructor.

URPN 369 Transportation and Urban Form
Credits 3. 3 Lecture Hours.
Examination of the interrelated nature of transportation, land use and urban design; familiarization with the role of transportation in contemporary society; understanding the interrelationships between transportation and urban form at both the regional and community levels.
Prerequisite: Junior or senior classification or approval of instructor.

URPN 370 Health Systems Planning
Credits 3. 3 Lecture Hours.
Introduction to planning in the health care system at both institutional and community levels.
Prerequisite: Junior or senior classification or approval of instructor.

URPN 371 Environmental Health Planning and Policy
Credits 3. 3 Lecture Hours.
Philosophical and historical relationships of human-environment-disease; environmental health domains and associated planning and policy organizations and initiative for monitoring, intervention, and prevention; interdisciplinary approaches for risk analysis of environmental health.
Prerequisite: Junior or senior classification or approval of instructor.

URPN 401 Policy Implementation
Credits 3. 3 Lecture Hours.
Techniques of implementing major urban development programs and plans; capital improvements programming and budgeting; overview of regulatory measures including zoning and subdivision regulations; public involvement process; and fiscal planning.
Prerequisite: URPN majors only.

URPN 440 Urban and Regional Economic Development
Credits 3. 3 Lecture Hours.
Examines economic development processes in urban and regional planning; issues explored include theoretical, the economic development planning process, ethics, location factors, intergovernmental relations, budgeting, and private sector revenue generation.
Prerequisite: URPN majors only or approval of instructor.

URPN 441 Neighborhood Revitalization
Credits 3. 3 Lecture Hours.
Examination of the causes of decline of central cities, with the goal of developing a realistic view of who is affected, and why, so that a realistic foundation can be laid for successful redevelopment projects; topics and case studies on downtown decline and redevelopment, older city neighborhood problems and retrofitting.
Prerequisite: URPN majors only or approval of instructor.

URPN 450 Emergency Management Principles and Practices
Credits 3. 3 Lecture Hours.
Introduction to the fundamental principles of emergency management.
Prerequisite: Upper division College of Architecture or approval of instructor.

URPN 451 Hazard and Vulnerability Analysis for Planners
Credits 3. 3 Lecture Hours.
Tools and techniques used by city planners and emergency managers to determine their jurisdictions' hazard risk and social vulnerability to disaster impacts.
Prerequisite: Junior or senior classification, URPN 450 or approval of instructor.
URPN 460 Sustainable Communities  
**Credits 3. 3 Lecture Hours.**  
Focuses on sustainable community with applications in public policy/ design including societal organization, disciplinary bound design and policy, and empowered approaches to design, social ecology and public policy; reading and review of relevant literature on sustainability, complemented with exercises to illustrate underlying principles.  
**Prerequisite:** Department majors and minors only or approval of instructor.

URPN 469 Urban Infrastructure  
**Credits 3. 3 Lecture Hours.**  
Foundation of planning and managing infrastructure and public services; utilization of life-cycle method of infrastructure planning and delivery, research theory and tools to perform basic infrastructure planning.  
**Prerequisite:** URPN majors only or approval of instructor.

URPN 470 Health Systems Planning and Policy  
**Credits 3. 3 Lecture Hours.**  
Analyzes health needs at community, regional and national levels; organization and supply of health services at community, regional and national levels; medical technology and its impact on health needs and system organization; medical care financing and its effects on health need and system organization; health planning for natural and human-made disasters; and service-learning for applying planning theories and methods.  
**Prerequisite:** Junior or senior classification or approval of instructor.

URPN 471 Planning Healthier Communities  
**Credits 3. 3 Lecture Hours.**  
Planning for the creation of healthier cities/communities; emphasis on the impact of global paradigmatic shifts regarding community health, stakeholder participation, coalition building, leadership, visioning the planning process, and the need for more systemic and process orientation in community building.  
**Prerequisite:** Junior or senior classification or approval of instructor.

URPN 481 Seminar  
**Credits 3. 3 Lecture Hours.**  
Seminar discussion of current topics in urban planning.  
**Prerequisite:** Senior classification.

URPN 483 Studio in Urban and Regional Science  
**Credits 1 to 6. 1 to 6 Lecture Hours.**  
Studio introduces the confluence of ecological, environmental, economic, social, cultural, and political forces impacting the planning, design, and development of complex urban environments; site planning, design process, sustainability.  
**Prerequisite:** URPN majors only or approval of instructor.

URPN 484 Internship  
**Credits 3. 3 Other Hours.**  
Practical experience in an office of design allied professionals; 12 week internship with a minimum of 480 hours; continuous employment; departmental pre-approval through the department internship coordinator required. May not be repeated for credit.  
**Prerequisites:** URPN majors only or approval of internship coordinator.

URPN 485 Directed Studies  
**Credits 1 to 5. 1 to 5 Other Hours.**  
Individual instruction in selected aspects of urban planning not adequately covered in other courses. May be taken 3 times for credit.  
**Prerequisite:** Upper level classification.

URPN 489 Special Topics in...  
**Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.**  
Selected topics in an identified field of urban studies. May be repeated for credit.

URPN 491 Research  
**Credits 1 to 4. 1 to 4 Other Hours.**  
Research conducted under the direction of faculty member in landscape architecture and urban planning. May be taken 2 times for credit.  
**Prerequisites:** Junior or senior classification.

URPN 493 Urban and Regional Studies Capstone Course  
**Credits 5. 5 Lecture Hours.**  
Syntheses and application of skills and knowledge gained through coursework applied to the development of creative solutions to real-world projects.  
**Prerequisites:** URPN 310, URPN 331, URPN 410, URPN 469; LAND 494; senior classification; URPN majors only.

URPN 494 Internship  
**Credits 6. 6 Other Hours.**  
Practical experience in public, private, non-profit and for profit organizations of design allied professionals; 18 week internship with a minimum of 720 hours; continuous employment; departmental pre-approval through the department internship coordinator required. May not be repeated for credit.  
**Prerequisites:** Upper level classification and approval of internship coordinator.

VIBS - Vet Integrative Biosci Courses

VIBS 204 Fundamentals of Food Toxicology and Safety  
**Credits 3. 3 Lecture Hours.**  
Toxicity and safety of various foods and food additives, ingredients and contaminants; occurrence, control and prevention of food transmitted diseases.  
**Prerequisite:** Sophomore classification and CHEM 101.

VIBS 222 Great Poisonings of the World  
**Credits 3. 3 Lecture Hours.**  
Exploration of the effect of intentional and accidental man-made and natural poisonings on humans and the environment and their impact on public policy.  
**Prerequisite:** Freshman or sophomore classification.

VIBS 277/NRSC 277 Introduction to Neuroscience  
**Credits 3. 3 Lecture Hours.**  
Neuroscience from the molecular to system levels; fundamental principles and knowledge of neuroscience; current research information on neuroscience.  
**Prerequisites:** Freshman or sophomore classification and approval of instructor.  
**Cross Listing:** NRSC 277/VIBS 277.

VIBS 285 Directed Studies  
**Credits 0 to 4. 0 to 4 Other Hours.**  
Directed studies in specific problem areas of veterinary anatomy and public health.  
**Prerequisites:** Freshman or sophomore classification and approval of department head.
VIBS 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of veterinary anatomy or topics not covered in other courses. May be repeated for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

VIBS 305 Biomedical Anatomy
Credits 4. 2 Lecture Hours. 4 Lab Hours.
Comprehensive mammalian gross anatomy, using the dog as the model species; laboratory dissection, veterinary nomenclature with human correlates and the application of anatomy to clinical situations.
Prerequisites: BIOL 114 and BIOL 124; junior or senior classification; BIMS major with a minimum overall 2.5 Texas A&M GPA.

VIBS 310 Biomedical Writing
Credit 1. 1 Lecture Hour.
Mechanisms by which knowledge is shared among researchers, clinicians and other science professionals, then disseminated to the general public; an assortment of written assignments to develop writing skills specific for communicating scientific concepts to a variety of audiences. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisite: Junior or senior classification.

VIBS 311 Biomedical Explorations through Narrative
Credit 1. 1 Lecture Hour.
Familiarization with the writing style required for biomedical and health science; instruction in writing styles and appropriate techniques to increase and strengthen writing abilities. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisite: VIBS 310 or approval of instructor.

VIBS 343 Histology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Normal tissues of vertebrates including histogenesis of some; histogenesis and organography of mammalian tissues.
Prerequisites: BIOL 114 and BIOL 124; CHEM 228; junior or senior classification; BIMS major with a minimum overall 2.5 Texas A&M GPA.

VIBS 401 Developmental Neurotoxicology
Credits 2. 2 Lecture Hours.
Effects of exposure to toxic substances on the developing nervous system; content to include mechanisms of toxicity of substances potentially devastating to the developing nervous system including lead, mercury and other heavy metals, alcohol, nicotine (smoking), pesticides, flame retardants, and others.
Prerequisite: Junior or senior classification.

VIBS 404 Food Toxicology and Safety
Credits 3. 3 Lecture Hours.
Toxicity and safety of various foods and food additives, ingredients, and contaminants; occurrence, control and prevention of food transmitted diseases.
Prerequisite: Junior or senior classification.

VIBS 407/NRSC 407 Core Ideas in Neuroscience
Credit 1. 1 Lecture Hour.
General overview of selected core ideas across the full spectrum of neuroscience.
Prerequisite: Junior or senior classification; background in science courses recommended.

VIBS 408 Neuroscience and Religion
Credits 3. 3 Lecture Hours.
Emphasis on the biology of the human mind in the context of religious implications.
Prerequisites: Junior or senior classification; concurrent enrollment in NRSC 407/VIBS 407 or VIBS 407/NRSC 407.

VIBS 411 Tumor Cell Biology and Carcinogenesis
Credits 3. 3 Lecture Hours.
(3-0) Principles of tumor biology; role of gene-environment interactions; molecular mechanisms regulating cancer initiation and progression; therapeutic treatment of cancer.
Prerequisites: BIMS 320/GENE 320 or equivalent; junior or senior classification.

VIBS 413 Introduction to Epidemiology
Credits 3. 3 Lecture Hours.
Study and measurement of disease and health in populations; examples from literature and current events; emphasizes concepts and appreciation for epidemiologic approaches and applications in life.
Prerequisite: Junior or senior classification.

VIBS 420 Computer Applications in Public Health Research
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Introduction to the use of computers for public health research applications, including word processing, spreadsheets, data base management and telecommunications.
Prerequisites: Senior classification or approval of instructor; BIMS major with a minimum overall 2.5 Texas A&M GPA.

VIBS 422 Endocrine Toxicology
Credits 4. 4 Lecture Hours.
Impacts of endocrine toxicology on endocrine system; prevalence, environmental and occupational use and disposal of environmental endocrine disrupting chemicals (EDCs); structure, toxicokinetics and mechanism of action of EDCs; effects of EDCs on the development and function, disorders and diseases of the endocrine and reproductive organs.
Prerequisites: Senior classification; approval of instructor.

VIBS 424/VTPP 424 Biomedical Neuroendocrinology and Endocrine Disorders
Credits 3. 3 Lecture Hours.
Neuroendocrine (hypothalamus-pituitary) control of puberty, menstruation, ovulation, pregnancy, labor, lactation, female reproductive cycles, male reproductive functions, thyroid and parathyroid, adrenal and kidney, diabetes, obesity, sleep, memory, learning and aging and their endocrine disorders; overview on biosynthesis, transport and signaling of peptide and neuropeptide hormones, steroids and prostaglandins.
Prerequisites: Honors, junior or senior classification, or approval of instructor.
Cross Listing: VTPP 424/VIBS 424.

VIBS 432 Public Health Practices
Credits 3. 3 Lecture Hours.
Study of various diseases, causes and methods of prevention; epidemiology of disease; social and behavioral sciences; health policy and management; environmental and occupational health.
Prerequisites: Junior or senior classification; BIMS major with a minimum overall 2.5 Texas A&M GPA.
VIBS 443 Biology of Mammalian Cells and Tissues  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Molecular phenomena placed in context with tissues, organs and organ systems; cell and tissue structures visualized by light microscopy and electron micrographs for functional relationships; clinical correlations reveal relevance of histology in specific disease states; conceptual thinking exercises facilitate problem-solving skills.  
Prerequisites: Junior or senior classification in life sciences and interest in health related careers.

VIBS 450/NRSC 450 Mammalian Functional Neuroanatomy  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Functional morphology of the domestic animal and human brain using gross specimens, microscopic sections, interactive computer-, DVD- and video-assisted instructional programs supplemented with clinical case studies.  
Prerequisites: Junior or senior classification; BIMS, biology, biochemistry, or psychology majors, or neuroscience minors with overall 3.5 Texas A&M GPA; or approval of instructor.  
Cross Listing: NRSC 450/VIBS 450.

VIBS 485 Directed Studies  
Credits 0 to 4. 0 to 4 Other Hours.  
Directed individual study of a selected problem in veterinary anatomy (with emphasis on neuroscience, cell biology, reproduction, developmental biology, marine mammal anatomy) approved by instructor or selected problems in veterinary public health (with emphasis on food safety, toxicology, epidemiology, informatics, zoonoses).  
Prerequisites: Junior or senior classification and approval of instructor.

VIBS 489 Special Topics in...  
Credits 1 to 4. 0 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in an identified area of veterinary anatomy (with emphasis on neuroscience, cell biology, genetics, reproduction, developmental biology, marine mammal anatomy) or selected topics in veterinary public health, epidemiology, zoonoses, food hygiene, food toxicology and mycotoxicology. May be repeated for credit.  
Prerequisites: Junior or senior classification and approval of instructor; BIMS major with a minimum overall 2.5 Texas A&M GPA.

VIBS 601 Anatomy  
Credits 4. 2 Lecture Hours. 6 Lab Hours.  
Topographical dissection of one of the following domestic animals: horse, ox, dog or cat. May be taken more than once but not to exceed 12 hours of credit toward a graduate degree.  
Prerequisite: VIBS 912 or 305 or equivalent.

VIBS 602 Histology  
Credits 4. 2 Lecture Hours. 6 Lab Hours.  
Molecular phenomena placed in context with tissues, organs and organ systems; cell and tissue structures visualized by light microscopy and electron micrographs for functional relationships; clinical correlations reveal relevance of histology in specific disease states; conceptual thinking exercises facilitate problem-solving skills.  
Prerequisite: Graduate classification.

VIBS 603/NRSC 603 Neuroanatomy  
Credits 4. 2 Lecture Hours. 6 Lab Hours.  
Gross, developmental and microscopic anatomy of nervous system of selected laboratory and domestic animals.  
Prerequisite: Approval of instructor.  
Cross Listing: NRSC 603/VIBS 603.

VIBS 604/NRSC 604 Biomedical Neuroendocrinology and Endocrine Disorders  
Credits 3. 3 Lecture Hours.  
Prerequisite: Approval of instructor.  
Cross Listing: NRSC 604/VIBS 604.

VIBS 605 Chemical Hazard Assessment  
Credits 3. 3 Lecture Hours.  
Chemical and biological methods for testing hazardous chemicals and complex mixtures; chemical analysis; microbial bioassays; developmental toxicity; enzyme induction; mammalian cell culture.  
Prerequisite: Graduate classification.

VIBS 606/NRSC 605 Neuroanatomical Systems  
Credits 3. 3 Lecture Hours.  
Emphasis on major neural systems that govern identifiable physiological functions, behavior and neurodegenerative disease; whole-brain anatomy is approached from a “systems” perspective, wherein components of defined functional systems are described in terms of their location, inputs and outputs, and physiological/behavioral significance in health and disease.  
Prerequisite: Approval of instructor.

VIBS 607 Applied Epidemiology  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
An introductory course of the application of epidemiological concepts to the study of disease occurrence in populations of lower animals and man. The purpose of epidemiology is to identify the host, agent and environmental determinants and dynamics of disease spread that provide the basis for successful preventive medicine and public health programs.

VIBS 608 Epidemiology Methods I  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Epidemiology concepts and methods used in the investigation of determinants of health or disease in populations; stressing basic methods for experimental design, conduct and analysis of both observational and experimental studies.  
Prerequisite: STAT 651 or equivalent.

VIBS 609 Anatomy of Reproductive Systems  
Credits 4. 2 Lecture Hours. 6 Lab Hours.  
Gross and microscopic anatomy of the reproductive systems of domestic animals.  
Prerequisite: VIBS 601 or VIBS 602 or VIBS 910 or equivalent. (Offered in alternate years.)

VIBS 610 Epidemiologic Methods II and Data Analysis  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Principles and methods for the analysis of data from epidemiologic studies including the purpose of data analysis and role of statistics, sampling distributions, probability distributions, analysis of crude, stratified and matched data, and the use of linear and logistic regression methods.  
Prerequisites: VIBS 608 and STAT 651 or approval of instructor.
VIBS 611 Tumor Cell Biology and Carcinogenesis  
Credits 3.3 Lecture Hours.  
Basic principles of tumor biology; role of gene-environment interactions; molecular mechanisms regulating cancer initiation and progression; therapeutic treatment of cancer.  
**Prerequisites:** BIMS 320/GENE 320 or equivalent; graduate classification.

VIBS 612 Mammalian Embryology  
Credits 3.3 Lecture Hours.  
Embryology of domestic mammals; gametogenesis, fertilization, cell proliferation and differentiation, and organogenesis; selected commonly occurring congenital defects of domestic animals used to emphasize embryologic sequences and processes.  
**Prerequisite:** Approval of instructor.

VIBS 613 Evolutionary Bioinformatics  
Credits 3.2 Lecture Hours.  
Principles and concepts in molecular evolution, population genetics, and evolutionary genomics; applications of quantitative approaches (computation, statistics, and mathematics) in analyzing large and complex biological data sets; algorithm design and development of scientific software using high-level high-performance computer languages; emerging techniques for integrative data analysis, and the assumptions, advantages, and limitations of these techniques.  
**Prerequisites:** BIOL 451 or GENE 320/BIMS 320/BIMS 320/GENE 320 or equivalent; or approval of instructor.

VIBS 615 Food Hygiene  
Credits 4.3 Lecture Hours. 4 Lab Hours.  
Clinical description, pathogenesis, diagnosis, source, epidemiology and prevention or control of food borne diseases caused by biological, chemical and natural hazards.  
**Prerequisite:** Graduate classification.

VIBS 616 Advanced Developmental Neurotoxicology  
Credits 3.3 Lecture Hours.  
Study of mechanisms of toxicity of substances potentially devastating to the developing brain and spinal cord including lead, mercury and other heavy metals, alcohol, nicotine (smoking), pesticides, flame retardants, and others.  
**Prerequisite:** Approval of instructor.

VIBS 617 Cell Biology  
Credits 1 to 5. 1 to 5 Lecture Hours.  
Series of five 1-hour credit modules focusing on selected aspects of structure, function, and signal transduction in eukaryotic cells through critical analysis of recent literature in the field. Each module listed as separate course section; students may enroll in up to five 1-hour module sections per semester.  
**Prerequisite:** Approval of instructor.

VIBS 619 Food Toxicology II  
Credits 3.3 Lecture Hours.  
Public health implications of toxic factors in foods, their source, nature, occurrence and distributions; emphasis on mycotoxins including their isolation, detection, identification and toxicology; study of state-of-the-art food safety research techniques.  
**Prerequisite:** Graduate classification.

VIBS 620/GENE 620 Cytogenetics  
Credits 3.3 Lecture Hours.  
Examination and analysis of variation in chromosome structure, behavior and number; developmental and evolutionary effects of this variation.  
**Prerequisite:** GENE 603.  
**Cross Listing:** GENE 620.

VIBS 621/NRSC 621 Fundamental Neuroanatomy  
Credits 4.4 Lecture Hours.  
A comprehensive review of the neuroanatomical determinants of function; rigorous neuroanatomical foundation relevant for research investigating changes in neural pathways and/or networks involved in sensory and motor functions, learning and memory, perception, selective attention, as well as recovery of function following brain damage.  
**Cross Listing:** NRSC 621/VIBS 621.

VIBS 622 Endocrine Toxicology  
Credits 4.4 Lecture Hours.  
Impacts of endocrine toxicology on endocrine system; prevalence, environmental and occupational use and disposal of environmental endocrine disrupting chemicals (EDCs); structure, toxicokinetics and mechanism of action of EDCs; effects of EDCs on the development and function, disorders and diseases of the endocrine and reproductive organs.  
**Prerequisite:** Graduate classification; approval of instructor.

VIBS 624/VTTP 624 Endocrinology  
Credits 4.3 Lecture Hours. 3 Lab Hours.  
Neuroendocrine control of puberty menstruation, ovulation, pregnancy, labor, lactation, female reproductive cycles, male reproductive functions, thyroid and parathyroid, adrenal and kidney, diabetes, obesity, sleep, memory, learning and aging, and their endocrine disorders; overview on biosynthesis, transport and signaling of peptide and neuropeptide hormones, steroids and prostaglandins.  
**Prerequisite:** Graduate classification.  
**Cross Listing:** VTTP 624/VIBS 624.

VIBS 627 Optical Microscopy and Live Cell Imaging  
Credits 3.2 Lecture Hours. 3 Lab Hours.  
Principles and practice of optical microscopy for life sciences; applications with fixed samples and live cells using digital microscopy, confocal and multiphoton microscopy, TIRF and laser capture microscopy equipment; applications with fluorescence probes of cellular function.  
**Prerequisite:** Approval of instructor.

VIBS 633 Animal Diseases in Comparative Medicine  
Credits 3.3 Lecture Hours.  
Study of major zoonotic diseases, including frequency of occurrence, clinical signs, diagnosis, epidemiology, bioterrorism concerns and the prevention or control in animals and humans.  
**Prerequisite:** Graduate classification.

VIBS 640/NRSC 640 Neurobiology  
Credits 1 to 5. 1 to 5 Lecture Hours.  
Biologic of the mammalian central nervous system with emphasis on cellular and molecular interactions; contemporary research topics in areas such as neuron-glia interactions, neuroimmunology, neuroendocrinology, developmental neurobiology and neurogenetics; extensive readings from primary literature.  
**Prerequisites:** Undergraduate or graduate cell biology, genetics and biochemistry or approval of instructor.  
**Cross Listing:** NRSC 640/VIBS 640.

VIBS 650 Education in a Veterinary Medical and Biomedical Environment  
Credits 1 to 3. 1 to 3 Lecture Hours.  
Philosophical, stylistic and methodological consideration for designing, planning implementing and evaluating effective veterinary medical and biomedical teaching and learning. Orientation for graduate school.  
**Prerequisite:** Graduate classification.
VIBS 655 Methods of Specialized Journalism  
Credits 3. 3 Lecture Hours.  
Writing and placement of magazine and journal articles in specialized areas of media content such as agriculture, ecology, science, business, education, natural resources; individual projects directed to student's field of interest.

VIBS 657 Issues in Science and Technology Journalism  
Credits 3. 3 Lecture Hours.  
Current issues, fundamental concepts in science and technology journalism, communication theory, science and journalism components, philosophy and literature of the field.

VIBS 658 Research Methods in Science and Technology Journalism  
Credits 3. 3 Lecture Hours.  
Research methods including theory, hypothesis formulation, design, data collection, data analysis, measurement and report writing. Qualitative and quantitative methods. Research topics.

VIBS 660 Reporting Science and Technology  
Credits 3. 3 Lecture Hours.  
Gathering, writing and editing complex information, translation techniques, interpretation and analysis, literary and organizational devices and measurement of readability.

VIBS 663 Biomedical Reporting  
Credits 3. 3 Lecture Hours.  
Sources of biomedical information, specialized information-gathering skills, key biomedical vocabulary/concepts, audiences, outlets, translation/interpretation, research, ethical issues.

VIBS 664 Risk and Crisis Reporting  
Credits 3. 3 Lecture Hours.  
Assessment and analysis of environmental and health risk, analytical procedures, interpretation of risk factors, reporting science crisis events.

VIBS 670 Basic Environmental Toxicology  
Credits 3. 3 Lecture Hours.  
Introduction to general principles of toxicology; test methods, target organs, toxicity of major classes of toxins/toxicants, and risk assessment for engineers and other non-toxicologists; risk assessment methodology.  
Prerequisite: VIBS 602 or approval of instructor.

VIBS 681 Seminar  
Credit 1. 1 Lecture Hour.  
Review and discussion of current scientific work in one of the department's areas of specialization (anatomy, cellular and molecular biology, epidemiology, food safety, genetics, informatics, neuroscience, public health concepts, reproduction/developmental biology, toxicology, zoonoses).

VIBS 684 Professional Internship  
Credits 1 to 4. 1 to 4 Other Hours.  
A directed internship in an organization to provide students with on-the-job training with professionals in settings appropriate to the student's professional objectives.  
Prerequisite: Approval by committee chair.

VIBS 685 Directed Studies  
Credits 1 to 4. 1 to 4 Other Hours.  
Research problem in one of the department's areas of specialization (anatomy, cellular and molecular biology, epidemiology, food safety, genetics, informatics, neuroscience, public health concepts, reproduction/developmental biology, toxicology, zoonoses, science and technology journalism).

VIBS 688 Epidemiological Modeling of Infectious Diseases  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Concepts of mathematical modeling of infectious diseases; steps and methods for the development and analysis of models.  
Prerequisite: Graduate classification.

VIBS 689 Special Topics in...  
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.  
Selected topics in one of the department's areas of specialization (anatomy, cellular and molecular biology, epidemiology, food safety, genetics, informatics, neuroscience, public health concepts, reproduction/developmental biology, toxicology, zoonoses, science and technology journalism).

VIBS 690 Theory of Research  
Credits 3. 3 Lecture Hours.  
Theory and design of research related to current biomedical problems especially those involving study of animal disease; philosophical perspectives underlying historical advances in research pertaining to the study, prevention and treatment of disease.  
Prerequisite: Graduate classification.

Cross Listing: VTPP 690 and VPAT 690.

VIBS 691 Research  
Credits 1 to 23. 1 to 23 Other Hours.  
Research reported by writing of thesis or dissertation as partial requirement for MS or PhD degree.  
Prerequisite: Approval of department head.

VIBS 910 Gross Anatomy I  
Credits 4. 2 Lecture Hours. 6 Lab Hours.  
Topographical dissection of the dog and comparative aspects of the domestic cat.  
Prerequisite: Enrollment in first year of professional curriculum.

VIBS 911 Microscopic Anatomy I  
Credits 4. 2 Lecture Hours. 6 Lab Hours.  
Microscopic study of cells, tissues and organ systems of domestic animals.  
Prerequisite: Enrollment in first year of professional curriculum.

VIBS 912 Gross Anatomy II  
Credits 4. 1 Lecture Hour. 8 Lab Hours.  
Comparative anatomy of farm animals; topographic dissection of common farm species.  
Prerequisite: Enrollment in first year of professional curriculum.

VIBS 913 Microscopic Anatomy II  
Credits 4. 2 Lecture Hours. 6 Lab Hours.  
Developmental anatomy of domestic animals with special emphasis on structural congenital defects; functional neuroanatomy and clinical neurology of domestic animals; essential clinical skills for the theory and practice of veterinary neurology.  
Prerequisite: Enrollment in first year of professional curriculum.

VIBS 926 Introduction to Public Health Concepts  
Credit 1. 1 Lecture Hour.  
Basic concepts and issues of public health as they relate to the veterinary medical profession.  
Prerequisite: Enrollment in first year of the professional curriculum.
VIIBS 930 Public Health
Credits 4. 4 Lecture Hours.
Principles and applications of epidemiology in veterinary medicine and the literature; history, epidemiology, symptoms, prevention and control of diseases transmitted between animals and humans; emphasis on emerging zoonotic diseases presenting occupational hazards for veterinary medicine; safety of foods of animal origin including foodborne illnesses.
Prerequisite: Enrollment in third year of professional curriculum or enrollment in graduate studies with approval of instructor.

VIIBS 948 Didactic Electives in Veterinary Anatomy
Credits 1 to 12. 1 to 12 Lecture Hours.
Elective course in veterinary anatomy (with emphasis on neuroscience, cell biology, genetics, reproduction, developmental biology, marine mammal anatomy) for professional students who wish to supplement required curriculum. May be repeated for credit.
Prerequisite: Enrollment in third year of professional curriculum.

VIIBS 985 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed individual study of a selected problem in veterinary anatomy (with emphasis on neuroscience, cell biology, genetics, reproductive biology, developmental biology, or marine mammal anatomy) or directed individual study of advanced topics in veterinary public health or epidemiology (with emphasis on food safety, toxicology, informatics, or zoonoses). May be repeated for credit.
Prerequisite: Matriculation in veterinary professional curriculum.

VIIBS 989 Special Topics in...
Credits 1 to 4. 1 to 4 Other Hours.
Selected topics in an identified area of veterinary anatomy (with emphasis on neuroscience, cell biology, genetics, reproductive biology, developmental biology or marine mammal anatomy) or selected topics in veterinary public health, epidemiology, zoonoses, food hygiene and food toxicology.
Prerequisite: Matriculation in veterinary professional curriculum.

VIST - Visual Studies

Courses

VIST 105 Principles of Design I
Credits 4. 2 Lecture Hours. 6 Lab Hours.
Survey of principles and theory of design and visual communication; elements and organizational structure of the visual language; sign, symbol, and meaning; visual perception; problem solving and the creative process; design in terms of value as well as color; emphasis on two-dimensional design.*

VIST 106 Principles of Design II
Credits 4. 2 Lecture Hours. 6 Lab Hours.
Fundamentals of spatial design; theory of form; transformations, additive/subtractive techniques as process; 3D composition; traditional modeling and construction techniques; formal visual analysis and critique.
Prerequisite: VIST 105.*

VIST 170 Introduction to Visualization Computing Environments
Credit 1. 2 Lab Hours.
Procedures, practices and environments useful for visual problem solving using programmatic languages; setup and use of the computing environment; useful system tools and commands; basic programming concepts and constructs.
Prerequisite: Visualization majors only or approval of instructor.

VIST 201 Writing for Design
Credit 1. 2 Lab Hours.
Writing as a discipline for the development, conceptualization, critique and presentation of visual works; emphasis on portfolio and narrative development.
Prerequisite: Major in visualization.

VIST 205 Principles of Design III
Credits 4. 2 Lecture Hours. 6 Lab Hours.
Introduction to the creative processes, workflows and methodologies used in the field of visualization including graphic design, interactivity and animation.
Prerequisites: ARTS 115; VIST 106; VIST 170.

VIST 206 Visual Studies Studio I
Credits 4. 2 Lecture Hours. 6 Lab Hours.
Theory and practice of traditional techniques for visual communication and visualization; the camera model; principles of physically based motion; time based media and animation; development of narrative and storytelling in the creative process.
Prerequisite: VIST 205.*

VIST 270 Computing for Visualization I
Credits 3. 3 Lecture Hours.
Introduction to the theory and practice of visual computer based problem solving; system tools; problem solving principles and practice; basics of software interaction and interface organization; development concepts and principles useful in digital art and visualization production.
Prerequisite: MATH 151; VIST 170.

VIST 271 Computing for Visualization II
Credits 3. 3 Lecture Hours.
Continuation of Computing for Visualization I; concepts of object oriented programming; emphasis on principles and techniques useful for three dimensional visualization and real time graphic display.
Prerequisite: MATH 152; VIST 270.

VIST 275 Introduction to Visualization
Credits 3. 3 Lecture Hours.
Introduction to visualization concepts, techniques and applications; introduction to significant visualization topics including cultural context, visual perception, the digital image, visual language, geometric modeling, animation, image creation, image compositing; application areas, ethical issues in visualization and the future of visualization.
Prerequisites: MATH 150 or equivalent; non-majors only.

VIST 284 Visualization Techniques
Credit 1. 2 Lab Hours.
Introduction to software used in the visual arts including 2D raster and vector systems, modeling, rendering, animation, post production and multimedia. Specific course content will vary based upon curriculum requirements. May be repeated for up to 3 credit hours.
Prerequisite: Major in visualization or minor in art.

VIST 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of visualization. May be repeated for credit.
Prerequisite: Approval of instructor.
VIST 305 Visual Studies Studio II  
Credits 3. 1 Lecture Hour. 5 Lab Hours.  
Theory and practice of visual communication employing digital and conventional media; development of artistic concepts, proposal development and related implementation techniques; introduction to digital painting, 3D modeling, animatics and post production.  
Prerequisites: VIST 206; upper level classification in visualization.*

VIST 310 Photography for Visualization  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Advanced aesthetic and thematic control of the digital image; exposure refinement; advanced lighting techniques and digital compositing; digital work-flow; image conversion and control; color management; digital forensics; printing technology, processes and presentation.  
Prerequisites: Visualization major or approval of instructor; junior or senior classification.

VIST 370 Interactive Virtual Environments  
Credits 3. 3 Lecture Hours.  
Languages and techniques useful for the creation of real time virtual environments; definition of formal scene description structures; modeling and transformation techniques; simulation techniques; behaviors and message passing; user interaction and animation; multiuser environments; creating virtual interfaces; scripting techniques.  
Prerequisite: Visualization majors; junior or senior classification; VIST 271.

VIST 372 Creating Digital Environments  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Terminology, principles and practices in the creation of 3D models; mathematical principles of geometrical modeling theory and application of modeling techniques; boolean operations; parametric modeling; modeling; particle systems; L-Systems; nurbs and/or grammar based techniques; lighting setup and control.  
Prerequisite: Visualization majors; junior or senior classification; VIST 271.

VIST 374 Multimedia Design and Development  
Credits 3. 2 Lecture Hours. 4 Lab Hours.  
Concepts and techniques for integrating multimedia with user control and interactivity; production of computer presentations and interactive mobile devices; computer animation, graphics, production and use of digital images; scripting techniques; projects for stand-alone computers and mobile devices.  
Prerequisite: Junior or senior classification or approval of instructor and undergraduate program coordinator.

VIST 375 Foundations of Visualization  
Credits 3. 3 Lecture Hours.  
A comprehensive introduction to visualization concepts, techniques and applications; major topic areas include cultural context, application areas, visual perception, the digital image, visual language, coordinate systems, geometric representation, modeling animation, image synthesis, image composing, ethics and the future of visualization.  
Prerequisites: MATH 152; VIST 271; junior or senior classification.

VIST 405 Visual Studies Studio III  
Credits 3. 1 Lecture Hour. 5 Lab Hours.  
Theory and practice in the art and science of the visual image; scientific and mathematical principles as process; information theory and sensorial design; interactivity and user integration; integration of real and virtual environments including lighting design and material definition.  
Prerequisites: VIST 305; CARC 301 or VIST 494.*

VIST 406 Visual Studies Studio IV  
Credits 3. 1 Lecture Hour. 5 Lab Hours.  
Theory and practice in the development of the digital image; non-traditional modeling methods; camera control and animation techniques; special effects; creative lighting methods; non-photorealistic rendering; integration of traditional and digital media in the creation of visual works.  
Prerequisites: VIST 305; CARC 301 or VIST 494.*

VIST 441 Scientific and Technological Developments in Visual Arts  
Credits 3. 3 Lecture Hours.  
Advanced level course focusing on the relationship between art, science and technology; visual arts before the digital revolution; the development of computer graphic arts.  
Prerequisite: Upper level classification or approval of the undergraduate program coordinator.

VIST 442 Digital Characters: Art, Technology, Uses and Meaning  
Credits 3. 3 Lecture Hours.  
Examination of the art and technology employed in the creation of digital characters; exploration of the reasons for, and impact of, their use in popular media and science; digital character creation techniques; estimating performance requirements; visual examples and written work used to illustrate topics and application areas.  
Prerequisite: Junior or senior classification.

VIST 455 Art, Culture and Time Based Media  
Credits 3. 2 Lecture Hours. 4 Lab Hours.  
Exploration of perception, vision and self-expression for communication through time based media; investigation of expression, vision, and visual language as a process; practice of visual communication strategies.  
Prerequisites: Junior or senior classification or approval of instructor.

VIST 470 Digital Rendering  
Credits 3. 3 Lecture Hours.  
Creation of photorealistic images; rendering techniques and control; perceptual and physical principles related to creating realistic images; lighting and environmental effects; properties of materials; rendering models and techniques for adding visual detail; shading languages.  
Prerequisite: Visualization majors; junior or senior classification; VIST 271.

VIST 472 Digital Compositing  
Credits 3. 3 Lecture Hours.  
History, mathematical foundations, techniques and applications used in combining two dimensional images for film, video and multimedia; includes theoretical foundations of the digital image, color spaces and corrections, matte techniques, keying, rotoscoping, camera and object tracking, stereo compositing and process workflow.  
Prerequisite: VIST 271, junior or senior classification.

VIST 474 Designing for the Web  
Credits 3. 2 Lecture Hours. 4 Lab Hours.  
Principles of web page and site creation; elements of visual design; typography for the web; web technologies; controlling the page real estate through cascading style sheets (CSS); imaging for the web; creation and use of color and graphics; web standards; building complete web sites.  
Prerequisite: Junior or senior classification or approval of instructor and undergraduate program coordinator.
VIST 484 Summer Internship
Credits 3. 3 Lecture Hours.
Practical experience in a visualization related company; 10-week internship with a minimum of 400 hours continuous employment; departmental pre-approval through the departmental internship coordinator required; post evaluation conducted following the internship. May not be repeated for credit.
Prerequisites: Upper level classification in visualization and approval of visualization intern coordinator.

VIST 485 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Special problems in visual studies. May be repeated for up to 9 credit hours.
Prerequisite: Approval of instructor and undergraduate program coordinator.

VIST 486 Introduction to Game Design
Credits 3. 3 Lecture Hours.
Computer game design; emphasis on interactive storytelling, game play and interface design; history of computer games, review of selected games; analysis of rules of play and simple game prototype development.
Prerequisite: Junior or senior classification.

VIST 487 Game Development
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Aesthetic and technical aspects of computer game development, including game mechanics, story development, content creation and game programming; includes game design, interface design, 3D modeling and animation, graphics algorithms, shader programming and artificial intelligence; group project includes the design and development of a game from start to finish.
Prerequisite: VIST 486 or CSCE 441 or approval of instructor; junior or senior classification.

VIST 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Special Topics in... Selected topics in an identified field of visual studies. May be repeated for up to 9 credit hours.
Prerequisite: Approval of instructor and undergraduate program coordinator.

VIST 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty members in visualization; emphasis on visual studies. May be repeated 2 times for credit.
Prerequisites: Upper level classification; approval of instructor and undergraduate program coordinator.

VIST 494 Internship
Credits 6. 6 Other Hours.
Practical experience in a visualization related company; equivalent of 600 hours over at least 15 weeks; departmental pre-approval through the departmental internship coordinator required; post evaluation conducted following the internship. May not be repeated for credit.
Prerequisites: Upper level classification in visualization and approval of visualization intern coordinator.

VLCS-Vet Large Animal Clin Sc

Courses

VLCS 422 Equine Disease and Epidemiology
Credits 3. 3 Lecture Hours.
Principles and methods of epidemiology applied to equine health and prevention and control of selected equine infectious diseases.
Prerequisite: Enrollment in equine certificate and junior or senior classification, or approval of instructor.

VLCS 485 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Directed individual study of selected problems in biomedical sciences approved by instructor. May be repeated for credit.
Prerequisites: Senior classification in biomedical science and approval of department head.

VLCS 622 Equine Epidemiology and Infectious Diseases
Credits 3. 3 Lecture Hours.
Principles and methods of epidemiology applied to equine health and prevention and control of selected equine infectious diseases.
Prerequisites: Enrollment in equine certificate and graduate classification, or approval of instructor.

VLCS 681 Seminar
Credit 1. 1 Lecture Hour.
Oral communication of current research and selected topics in large animal veterinary medicine and clinical research methodology to include lectures, presentations, interviews, and discussions.
Prerequisite: Approval of instructor.

VLCS 685 Directed Studies
Credits 1 to 8. 1 to 8 Other Hours.
Original investigations of problems in the field of large animal surgery, therapeutics, preventive veterinary medicine or radiology. May be repeated for credit.
Prerequisites: Approval of instructor.

VLCS 930 Advanced Equine Medicine and Surgery
Credits 3. 3 Lecture Hours.
Advanced diagnostic techniques and management strategies for species specific disorders of horses.
Prerequisite: Enrollment in the third year of professional curriculum.

VLCS 931 Advanced Ruminant Medicine and Surgery
Credits 2. 2 Lecture Hours.
Advanced diagnostic techniques and management strategies for species specific disorders of ruminant species.
Prerequisite: Enrollment in the third year of professional curriculum.

VLCS 932 Advanced Ruminant Herd Health and Production
Credits 2. 2 Lecture Hours.
Principles needed to provide veterinary services to populations of ruminants including preventive health programs, record keeping and approaches to controlling herd/flock disease outbreak or production shortfalls.
Prerequisite: Third year veterinary student.

VLCS 940 Large Animal Clinics I
Credits 2. 35 Lab Hours.
Student participation with clinical cases in the large animal medicine services of the Veterinary Teaching Hospital. Must be taken two times.
Prerequisite: Fourth year classification in veterinary medicine or approval of department head.
Prerequisite: Therapeutics or Radiology.

Original investigations of problems in the field of small animal surgery. Repeated for credit.

**Prerequisite:** Fourth year classification.

**VLCS 945 Advanced Large Animal Clinical Elective**

Credits 2. 35 Lab Hours.

Student participation with clinical cases for advanced study in selected services from the large animal medicine, surgery, theriogenology, and field services of the Veterinary Teaching Hospital. May be taken 12 times.

**Prerequisite:** Fourth year classification.

**VLCS 948 Large Animal Medicine and Surgery Elective**

Credits 1 to 12. 1 to 12 Lecture Hours.

In-depth study of selected disease processes in the various disciplines of large animal medicine and surgery will be conducted emphasizing management, diagnostics, and medical or surgical treatment. May be repeated for credit.

**Prerequisite:** Third year classification in veterinary medicine or approval of department head.

**VLCS 953 Large Animal Clinical Skills**

Credit 1. 4 Lab Hours.

Acquisition of basic technical skills useful in the diagnosis and treatment of large animals in general veterinary practice. Modular one-month course.

**Prerequisite:** Third year classification in veterinary medicine in good standing.

**VLCS 954 Large Animal Medicine**

Credits 6. 5 Lecture Hours. 4 Lab Hours.

Medical disease of large animals; pathophysiology, diagnosis, and therapy of diseases in large animals.

**Prerequisite:** Third year classification in veterinary medicine in good standing.

**VLCS 956 Directed Studies**

Credits 1 to 4. 1 to 4 Other Hours.

Directed individual study of a selected problem in large animal medicine, surgery, or radiology. May be repeated for credit.

**Prerequisite:** Enrollment in veterinary medicine and approval of the department head.

**VSCS-Vet Small Animal Clin Sc**

**Courses**

**VSCS 485 Directed Studies**

Credits 0 to 4. 0 to 4 Other Hours.

Directed individual study of a selected problem in biomedical sciences approved by instructor. May be repeated for credit.

**Prerequisites:** Junior or senior classification and approval of department head and instructor.

**VSCS 681 Seminar**

Credit 1. 1 Other Hour.

Current scientific work in medical and surgical fields in and related to small animal medicine and surgery. May be repeated for credit.

**Prerequisite:** DVM degree or approval of department head.

**VSCS 685 Directed Studies**

Credits 1 to 8. 1 to 8 Other Hours.

Original investigations of problems in field of small animal surgery, therapeutics or radiology.

**Prerequisite:** DVM degree or approval of instructor and department head.

**VSCS 691 Research**

Credits 1 to 23. 1 to 23 Other Hours.

Research for thesis.

**VSCS 940 Small Animal Clinics I**

Credits 2. 35 Lab Hours.

Student participation with clinical cases in the small animal medicine services of the Veterinary Teaching Hospital. Must be taken two times.

**Prerequisite:** Fourth year classification in veterinary medicine or approval of department head.

**VSCS 941 Small Animal Clinics II**

Credits 2. 35 Lab Hours.

Student participation with clinical cases in the small animal medicine services of the Veterinary Teaching Hospital. Must be taken two times.

**Prerequisite:** VSCS 940 or approval of department head.

**VSCS 945 Advanced Small Animal Clinical Elective**

Credits 2. 35 Lab Hours.

Student participation with clinical cases for advanced study in the small animal medicine and surgery sections of the Veterinary Teaching Hospital. May be taken 12 times.

**Prerequisite:** VSCS 940 or approval of department head.

**VSCS 948 Small Animal Medicine and Surgery Elective**

Credits 1 to 12. 1 to 12 Lecture Hours.

In-depth study of selected disease processes in the various disciplines of small animal medicine and surgery will be conducted emphasizing management, diagnostics, and medical or surgical treatment. May be repeated for credit.

**Prerequisite:** Third year classification in veterinary medicine or approval of department head.

**VSCS 949 Small Animal Medicine II**

Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 6 Lab Hours.

Continuation of Small Animal Medicine I; medical disease of dogs and cats; pathophysiology, diagnosis, and therapy of diseases prevalent in small animals.

**Prerequisite:** Third year classification in veterinary medicine in good standing.

**VSCS 953 Small Animal Clinical Skills**

Credit 1. 1 Lecture Hour.

Acquisition of basic technical skills useful in the diagnosis and treatment of small animals in general veterinary practice. Modular one-month course.

**Prerequisite:** Third year classification in veterinary medicine in good standing.

**VSCS 954 Small Animal Medicine I**

Credits 6. 5 Lecture Hours. 2 Lab Hours.

Medical disease of dogs and cats; pathophysiology, diagnosis, and therapy of diseases prevalent in small animals.

**Prerequisite:** Third year classification in veterinary medicine in good standing.

**VSCS 955 Small Animal Medicine II**

Credits 6. 6 Lecture Hours. 2 Lab Hours.

Continuation of Small Animal Medicine I; medical disease of dogs and cats; pathophysiology, diagnosis, and therapy of diseases prevalent in small animals.

**VSCS 985 Directed Studies**

Credits 1 to 4. 1 to 4 Other Hours.

Directed individual study of a selected problem in small animal medicine, surgery, or radiology. May be repeated for credit.

**Prerequisites:** Matriculation in veterinary professional curriculum and approval of department head.
VTPB - Veterinary Pathobiology

Courses

VTPB 212 Genetics in the News
Credits 3. 3 Lecture Hours.
Use of contemporary news articles from the popular press to delve into the science of genetics and genomics and their methodologies to gain a deeper understanding of how data is analyzed and interpreted leading to news headlines.
Prerequisites: Sophomore classification or approval of instructor; high school or college course in biology recommended.

VTPB 221 Great Diseases of the World
Credits 3. 3 Lecture Hours.
Great infectious and parasitic diseases; introduction to the major diseases affecting humans and other mammals including plague, tuberculosis, AIDS and malaria.
Prerequisite: Freshman or sophomore classification.

VTPB 285 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Directed individual study of selected problems in microbiology, parasitology, immunology, genetics or pathology as approved by instructor.
Prerequisites: Approval of department head; freshman or sophomore classification.

VTPB 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of veterinary pathobiology. May be repeated for credit.
Prerequisite: Freshman classification.

VTPB 301/WFSC 327 Wildlife Diseases
Credits 3. 3 Lecture Hours.
Basic mechanisms of diseases as they occur in wildlife populations; interplay of habitat requirements, individual physiological requirements and disease producing mechanisms of varied wildlife species.
Prerequisite: Junior classification or approval of department head.
Cross Listing: WFSC 327/VTPB 301.

VTPB 303 Medical Communication in the International Community
Credits 2. 2 Lecture Hours.
To develop an awareness that there is a culture associated with the practice of veterinary and human medicine in other countries.
Prerequisite: Junior or senior classification.

VTPB 334 Poultry Diseases
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Poultry sanitation and diseases. Prevention and control of environmental, nutritional, parasitic and contagious diseases.
Prerequisites: BIOL 113 and BIOL 123; junior or senior classification.

VTPB 404 Amazon Field School
Credits 4. 4 Lecture Hours.
Investigation of social and ecological complexities of biodiversity conservation in tropical ecosystems; biological and social science approaches to evaluate causes, consequences and solutions to biodiversity loss through ecology, culture and governance.
Prerequisites: Junior or senior classification with a minimum GPA of 2.0 and approval of instructor.
Cross Listing: RPTS 454 and WFSC 454.

VTPB 405 Biomedical Microbiology
Credits 5. 3 Lecture Hours. 5 Lab Hours.
Fundamentals of bacteriology, mycology, virology, infectious diseases, immunology and identification of pathogenic microorganisms.
Prerequisite: Junior classification in a biological science.

VTPB 407 Advanced Veterinary Microbiology Laboratory
Credits 1 to 3. 1 to 4 Lab Hours.
Modular course (one credit per module) that covers immunological and molecular techniques used with bacteria, parasites and viruses in animals for diagnostic and identification purposes.
Prerequisites: VTPB 405. VTPB 409 and VTPB 438 or concurrent enrollment; junior or senior classification.

VTPB 408 Clinical Microbiology
Credits 4. 2 Lecture Hours. 5 Lab Hours.
Practical application of clinical bacteriology and mycology; laboratory identification of pathogenic organisms.
Prerequisites: VTPB 405; junior or senior classification.

VTPB 409 Introduction to Immunology
Credits 3. 3 Lecture Hours.
Diverse concepts relative to immunologic mechanisms inherent to domestic and laboratory animals.
Prerequisite: Advanced classification.

VTPB 410 Cell Mechanisms of Disease
Credits 3. 3 Lecture Hours.
Mechanisms, morphologic manifestations and clinical signs of disease processes at the cellular level.
Prerequisites: VTPP 423 or registration therein; junior or senior classification.

VTPB 412 Techniques of Clinical Pathology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Theory and pathophysiologic principles underlying laboratory evaluation of disease states; principles of analytical methods with applications in the contemporary biomedical laboratory considered, using selected hematology and clinical chemistry techniques as examples.
Prerequisites: CHEM 228 and CHEM 238; VTPP 423; senior classification in biomedical science or approval of instructor.

VTPB 415 Immunogenetics and Comparative Immunology
Credits 3. 3 Lecture Hours.
Genetic mechanisms used to diversify immune receptors; immunoglobulins, T cell receptors, major histocompatibility complex, natural killer cell receptors, toll-like receptors and many others; selected comparative and veterinary examples of different immune recognition systems; evolution of the immune system.
Prerequisites: Junior or senior classification, GENE 320/BIMS 320 and VTPB 409 or approval of instructor.

VTPB 421 Bacterial Diseases of Humans and Animals
Credits 3. 3 Lecture Hours.
Pathogenesis of selected bacterial pathogens of humans and animals; bacterial virulence factors, host immune responses; current concepts of extracellular, facultative intracellular and obligate intracellular bacterial diseases.
Prerequisites: VTPB 405 and VTPB 409; junior or senior classification.

VTPB 438 Biomedical Virology
Credits 3. 3 Lecture Hours.
Fundamental study of nature and characteristics of human and animal viruses; classification, morphology, chemical structure, ability to cause disease and nature of resulting disease.
Prerequisite: 3 hours of microbiology or approval of instructor.
VTPB 452 Clinical Veterinary Mycology  
**Credits 3. 2 Lecture Hours. 2 Lab Hours.**  
Practical application of clinical mycology; laboratory identification of important fungal and actinomycotic organisms.  
**Prerequisites:** Junior or senior classification; VTPB 405 or approval of instructor.

VTPB 454/MARB 454 Ornamental Fish Health Management  
**Credits 3. 3 Lecture Hours.**  
Maintenance and health care of ornamental fish in closed recirculating systems; aquariology, anatomy and physiology, nutrition, immunology, infectious and noninfectious diseases, checklists, quarantine procedures and health maintenance of ornamental fish.  
**Prerequisites:** VTPB 405 or BIOL 351; BICH 410 or MARS 360; junior or senior classification.  
**Cross Listing:** MARB 454.

VTPB 485 Directed Studies  
**Credits 0 to 4. 0 to 4 Other Hours.**  
Directed individual study of selected problems in microbiology, parasitology, immunology, genetics or pathology as approved by instructor.  
**Prerequisites:** Approval of department head; junior or senior classification.

VTPB 487/BIOL 487 Biomedical Parasitology  
**Credits 4. 3 Lecture Hours. 2 Lab Hours.**  
Helminth and protozoan parasites of medical and veterinary importance; life cycles, morphology, taxonomic classification, economic and public health aspects and current topics in parasitic diseases.  
**Prerequisites:** BIOL 107 or BIOL 114; junior classification or approval of instructor.  
**Cross Listing:** BIOL 487/VTPB 487.

VTPB 489 Special Topics in...  
**Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.**  
Selected topics in an identified area of microbiology, pathology, genetics, immunology, parasitology, or physiological chemistry. May be repeated for credit.  
**Prerequisites:** Junior or senior classification and approval of department head.

VTPB 910 Veterinary Immunology  
**Credits 2. 2 Lecture Hours.**  
Introduction to veterinary immunology; mechanisms of resistance of infectious diseases and tumors; tissue injury caused by the immune system, including hypersensitivitiy reactions and autoimmunity; immunization theory and practices; immunologic methods for diagnosis of disease.  
**Prerequisite:** Enrollment in the first year of professional curriculum.

VTPB 911 Veterinary Microbiology  
**Credits 4. 3 Lecture Hours. 2 Lab Hours.**  
Introduction to veterinary microbiology; bacterial, viral, and mycotic agents of veterinary significance; mechanisms of host injury by pathogenic microorganisms; principles of disinfection, antisepsis, and sterilization; classes and mechanisms of mechanisms of action of antibacterial, antifungal, and antiviral drugs; diagnostic procedures and methods of sample collection.  
**Prerequisite:** Enrollment in the first year of professional curriculum.

VTPB 913 Infectious Diseases  
**Credits 2. 2 Lecture Hours.**  
Case-based approach to infectious diseases of animals; includes infectious diseases of major body systems; etiologic agents include viruses, bacteria, fungi, protozoa, helminths, and arthropods; differential diagnosis of infectious agents, diagnostic approaches, prevention, and treatment emphasized; management practices to control infectious diseases covered by host species.  
**Prerequisite:** Enrollment in second year of the professional curriculum.

VTPB 920 Parasitology  
**Credits 5. 3 Lecture Hours. 4 Lab Hours.**  
Taxonomy, biological and clinical aspects of the commonly occurring helminth, protozoan and arthropod parasites of domestic and laboratory animals. Signs, pathogenesis, diagnosis, treatment, prevention, and control, public health and economic importance of parasitic diseases.  
**Prerequisite:** Enrollment in the second year of professional curriculum.

VTPB 922 Pathology I  
**Credits 6. 5 Lecture Hours. 2 Lab Hours.**  
Structural and functional changes in cells, tissues and organ systems of animals; pathogenesis, mechanisms and morphologic features of diseases and their relationship to clinical signs; laboratory consists of studies of gross and microscopic pathology.  
**Prerequisite:** Enrollment in the second year of professional curriculum.

VTPB 923 Pathology II  
**Credits 6. 5 Lecture Hours. 2 Lab Hours.**  
Pathogenesis, mechanisms, laboratory analysis and structural features of animal diseases; structural and functional changes in cells, tissues, body fluids and organ systems that cause or are caused by disease. Laboratory consists of studies in gross and microscopic pathology, cytology and laboratory analysis of body fluids and tissues.  
**Prerequisite:** Enrollment in the second year of professional curriculum.

VTPB 940 Diagnostics  
**Credits 2. 35 Lab Hours.**  
Student group participation on a rotating schedule in applied clinical activities in the area of diagnostic medicine including clinical pathology, necropsy, microbiology, parasitology, and serology.  
**Prerequisite:** Enrollment in the fourth year professional curriculum.

VTPB 941 Clinical Microbiology and Parasitology I  
**Credits 2. 35 Lab Hours.**  
Clinical rotation in microbiology and parasitology with emphasis on performance and interpretation of diagnostic procedures.  
**Prerequisite:** Enrollment in the fourth year of professional curriculum.

VTPB 948 Didactic Elective  
**Credits 1 to 12. 1 to 12 Lecture Hours.**  
Elective course in veterinary microbiology, pathology, genetics, immunology or parasitology for professional students who wish to supplement required curriculum. May be repeated for credit.  
**Prerequisite:** Enrollment in the third year of professional curriculum.

VTPB 985 Directed Studies  
**Credits 1 to 4. 1 to 4 Other Hours.**  
Problems in various subdisciplines.  
**Prerequisite:** Approval of instructor.

VTPB 989 Special Topics in...  
**Credits 1 to 4. 1 to 4 Lecture Hours.**  
Selected topics in an identified area of microbiology, pathology, genetics, immunology or parasitology. May be repeated for credit.  
**Prerequisite:** Approval of department head.
VTPP - Vet Physiology & Pharm

Courses

VTPP 123 Foundations of Physiology
Credits 3. 3 Lecture Hours.
Introduction to fundamental concepts in physiology and the practice of physiology research through exploration of mathematical models used in physiology research; emphasis on prediction of complex adaptive behavior in health and disease from elementary math, physics, chemistry and biology.

Prerequisites: Seminar presentations.

VTPP 223 Design of Experiments for Physiology Research
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Team or group formulation and refinement of novel hypotheses and design of controlled in vitro experiments; emphasis on production of publishable research in physiology.
Prerequisite: VTPP 123 or approval of instructor.

VTPP 224 In Vitro Experimentation in Physiology Research
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Team or group collection, analysis and interpretation of data from in vitro experiments; emphasis on production of publishable research in physiology.
Prerequisite: VTPP 223 or approval of instructor.

VTPP 234 Design of Models for Physiology Research
Credits 3. 3 Lecture Hours.
Team or group design of novel models of physiological systems to predict homeostatic behavior arising from the interaction of subsystems; emphasis on production and formal presentation of basic research in physiology.
Prerequisite: VTPP 123 or approval of instructor.

VTPP 235 Analysis and Validation of Models for Physiology Research
Credits 3. 3 Lecture Hours.
Team or group analysis and validation of models of physiological systems to explain disease states and design potential clinical interventions; emphasis on production of publishable applied research in physiology.
Prerequisite: VTPP 234 or approval of instructor.

VTPP 281 Seminar
Credits 4. 4 Other Hours.
Exposure to scientists from a variety of biomedical disciplines through attendance at seminars followed by review and discussion of current scientific work in physiology and related subjects, and subsequent student seminar presentations.
Prerequisites: Freshman or sophomore classification; approval of instructor.

VTPP 285 Directed Studies
Credits 0 to 4. 0 to 4 Other Hours.
Course for freshman and sophomore students who desire additional laboratory work in physiology to supplement required courses.
Prerequisites: Freshman or sophomore classification; approval of department head.

VTPP 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of veterinary physiology and pharmacology. May be repeated for credit.

VTPP 291 Research
Credits 0 to 4. 0 to 4 Other Hours.
Laboratory and/or field research supervised by a faculty member
Prerequisites: Freshman or sophomore classification; approval of instructor.

VTPP 323 Physiology of Domestic Animals
Credits 3. 3 Lecture Hours.
Physiology essential to understanding of life processes. For students in agriculture and related fields.
Prerequisite: Junior classification.

VTPP 401 History of Human and Veterinary Medicine in Europe
Credits 4. 4 Lecture Hours.
Addresses the major developments in human and veterinary medicine in Europe from the Middle Ages to the present; explores key events and figures in medical history and analyzes issues of current biomedical concern in an historical context; for example, animal rights, ethics of human experimentation, euthanasia.

VTPP 423 Biomedical Physiology I
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Physiological principles, review of cellular physiology, and development of an understanding of the nervous system and muscle, cardiovascular, and respiratory physiology; clinical applications related to organ systems.
Prerequisites: VIBS 305; junior or senior classification.

VTPP 424/VIBS 424 Biomedical Neuroendocrinology and Endocrine Disorders
Credits 3. 3 Lecture Hours.
Neuroendocrine (hypothalamus-pituitary) control of puberty, menstruation, ovulation, pregnancy, labor, lactation, female reproductive cycles; male reproductive functions, thyroid and parathyroid, adrenal and kidney, diabetes, obesity, sleep, memory, learning and aging and their endocrine disorders; overview on biosynthesis, transport and signaling of peptide and neuropeptide hormones, steroids and prostaglandins.
Prerequisites: Honors, junior or senior classification, or approval of instructor.
Cross Listing: VIBS 424/VTPP 424.

VTPP 425 Pharmacology
Credits 3. 3 Lecture Hours.
Introduction to pharmacokinetics and pharmacodynamics; survey of major pharmaceutical classes; uses, mechanisms of action and adverse reactions of selected agents.
Prerequisites: VTPP 423 or approval of instructor; junior or senior classification.

VTPP 427 Biomedical Physiology II
Credits 3. 3 Lecture Hours.
Continuation of VTPP 423. Fluid balance and acid-base balance; development of an understanding of renal, gastrointestinal, endocrine and reproductive physiology using human and other mammalian models; clinical applications related to organ systems.
Prerequisites: VTPP 423; junior or senior classification.

VTPP 429 Introduction to Toxicology
Credits 3. 3 Lecture Hours.
An overview of toxicology with emphasis on environmental, human and animal health issues.
Prerequisite: Junior or senior classification.

VTPP 434 Physiology for Bioengineers I
Credits 4. 3 Lecture Hours. 1 Lab Hour.
Cellular anatomy, cellular physiology and biochemistry; systems analysis of digestive, endocrine and musculoskeletal system function including information related to gross anatomy, histology and disease states; quantitative aspects of physiology and engineering applications to clinical medicine.
Prerequisites: Junior or senior classification; biomedical engineering major or approval of instructor.
VTTP 435 Physiology for Bioengineers II
Credits 4.3 Lecture Hours. 1 Lab Hour.
A systems analysis of nervous, cardiovascular, respiratory and urinary function including information related to gross anatomy, histology and disease states; quantitative aspects of physiology and engineering applications to clinical medicine.
Prerequisites: VTTP 434; junior or senior classification.

VTTP 438 Analysis of Genomic Signals
Credits 3.2 Lecture Hours. 2 Lab Hours.
Overview of current high throughput technology for data acquisition and analysis of genomic signals (e.g. mRNA or proteins); emphasis on the microarray technology, methods for analyzing microarray data, and approaches to model the underlying phenomena from the systems biology perspective.
Prerequisites: Junior or senior classification; BIMS 320/GENE 320 or GENE 320/BIMS 320 and BIOL 111, BIOL 112 or BIOL 213 or equivalent; STAT 302 or equivalent.

VTTP 439 Non-Coding RNA's
Credits 3.3 Lecture Hours.
Advanced topics in noncoding RNA's in gene regulation; investigation of the role of noncoding RNAs and epigenetic regulatory factors in modulating gene expression, physiological functions and disease development.
Prerequisite: Junior or senior classification or approval of instructor.

VTTP 444 Practicum in Biomedical Research
Credits 3.3 Other Hours.
Team or group development of sustainable collaborations that include biomedical research, high-impact educational practices and community service; focus on connecting research experience to future career goals.
Prerequisites: VTTP 423 and VTTP 427 or VTTP 434 and VTTP 435; junior or senior classification.

VTTP 450 Stem Cell Physiology
Credits 3.3 Lecture Hours.
Advanced topics in stem cell biology; exploration of mammalian stem cells, stem cell characteristics, cell differentiation potency, molecular basis of stem cell signaling, regulatory pathways, research tools and experimental models.
Prerequisite: Junior or senior classification or approval of instructor.

VTTP 452 Fetal and Embryo Physiology
Credits 3.3 Lecture Hours.
Introduction to the physiologic processes driving embryonic development and pregnancy; focus on embryo implantation, establishment of the placenta, development of the fetal circulatory systems and the molecular processes governing embryo differentiation and development; special emphasis on the major organ systems affected by pediatric disease and on the actions of teratogens.
Prerequisite: BICH 410 or equivalent, or approval of instructor.

VTTP 481 Seminar
Credits 4.4 Other Hours.
Exposure to scientists from a variety of biomedical disciplines through attendance at seminars followed by review and discussion of current scientific work in physiology and related subjects, and subsequent student seminar presentations.
Prerequisites: Junior or senior classification; approval of instructor.

VTTP 485 Directed Studies
Credits 0 to 4.0 to 4 Other Hours.
Course for junior and senior students who desire additional laboratory work in physiology to supplement required courses.
Prerequisites: Junior or senior classification and approval of department head.

VTTP 489 Special Topics in...
Credits 1 to 4.1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of physiology, pharmacology, endocrinology or toxicology. May be repeated for credit.
Prerequisite: Junior or senior classification.

VTTP 491 Research
Credits 0 to 4.0 to 4 Other Hours.
Laboratory and/or field research supervised by a faculty member.
Prerequisites: Junior or senior classification; approval of instructor.

VTTP 605 Systemic Veterinary Physiology I
Credits 5.5 Lecture Hours.
Aspects of cellular physiology, physiology of excitable membranes, physiology of body fluids, neurophysiology, and the physiology of smooth, cardiac and skeletal muscle; provides a basic understanding of mammalian physiology essential as a framework for advanced graduate studies.
Prerequisite: Graduate classification.

VTTP 606 Systemic Veterinary Physiology II
Credits 5.5 Lecture Hours.
In-depth study covering cardiovascular, respiratory, renal physiology, gastrointestinal and endocrine physiology; provides a basic understanding of mammalian physiology essential as a framework for advanced graduate studies.
Prerequisite: VTTP 605.

VTTP 610 Physiology I
Credits 6.5 Lecture Hours. 2 Lab Hours.
Introduction to physiology: cell physiology, cell signaling, cell cycle, body fluids, translocation of materials, membrane potentials, neurophysiology, autonomic nervous system, thermoregulation, cardiovascular, and muscle physiology.
Prerequisites: Enrollment in MS/PhD program in Veterinary Physiology and Pharmacology; approval of instructor.

VTTP 612 Physiology II
Credits 6.5 Lecture Hours. 2 Lab Hours.
Blood and lymph, respiration, renal physiology, and acid-based balance, gastrointestinal physiology, metabolism, endocrinology, and reproduction.
Prerequisites: Enrollment in MS/PhD program in Veterinary Physiology and Pharmacology; approval of instructor.

VTTP 623 Biomedical Physiology I
Credits 4.3 Lecture Hours. 2 Lab Hours.
Physiological principles, review of cellular physiology, and development of an understanding of the nervous system and muscle, cardiovascular, and respiratory physiology; clinical applications related to organ systems.
Prerequisites: Graduate classification; BICH 410 and VIBS 305 recommended.
VTTP 624/VIBS 624 Endocrinology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Neuroendocrine control of puberty; menstruation, ovulation; pregnancy, labor, lactation; female reproductive cycles, male reproductive functions, thyroid and parathyroid, adrenal and kidney; diabetes, obesity, sleep, memory, learning and aging, and their endocrine disorders; overview on biosynthesis, transport and signaling of peptide and neuropeptide hormones, steroids and prostaglandins.
Prerequisite: Graduate classification.
Cross Listing: VIBS 624.

VTTP 625 Pharmacology
Credits 3. 3 Lecture Hours.
Introduction to pharmacokinetics and pharmacodynamics; survey of major pharmaceutical classes; uses, mechanisms of action and adverse reactions of selected agents.
Prerequisites: Graduate classification; VTTP 423 or approval of instructor.

VTTP 627 Biomedical Physiology II
Credits 3. 3 Lecture Hours.
Continuation of VTTP 623 Fluid balance and acid-base balance; development of an understanding of renal, gastrointestinal, endocrine and reproductive physiology using human and other mammalian models; clinical applications related to organ systems.
Prerequisites: Graduate classification; VTTP 623.

VTTP 628 Pharmacology I
Credits 5. 4 Lecture Hours. 2 Lab Hours.
Pharmacokinetics, pharmacodynamics, CNS pharmacology, autonomic pharmacology, antineoplastic agents, immunopharmacology, recombinant products, fluid and electrolyte therapy, diuretics, pharmacology of the integument.
Prerequisite: Approval of instructor.

VTTP 629 Pharmacology II
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Antimicrobials, endocrine pharmacology, eicosanoids, anti-inflammatory agents, respiratory pharmacology, anticoagulants and hematinics, GI pharmacology, cardiovascular pharmacology.
Prerequisite: Approval of instructor.

VTTP 630 Pharmacology/Toxicology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Management and treatment of toxicosis, antidotal pharmacology, toxic plants, mycotoxins, chemical toxicants, metals, euthanasia.
Prerequisite: Approval of instructor.

VTTP 634 Physiology for Bioengineers I
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Cellular anatomy, cellular physiology and biochemistry; systems analysis of digestive, endocrine and musculoskeletal system function including information related to gross anatomy, histology and disease states; quantitative aspects of physiology and engineering applications to clinical medicine.
Prerequisite: Biomedical Engineering major or approval of instructor.

VTTP 635 Physiology for Bioengineers II
Credits 4. 3 Lecture Hours. 3 Lab Hours.
A systems analysis of nervous, cardiovascular, respiratory and urinary function including information related to gross anatomy, histology and disease states; quantitative aspects of physiology and engineering applications to clinical medicine.
Prerequisite: VTTP 634.

VTTP 638 Analysis of Genomic Signals
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Overview of current high throughput technology for data acquisition and analysis of genomic signals (e.g., mRNA or proteins); emphasis on microarray technology, methods for analyzing microarray data, and approaches to model the underlying phenomena from the systems biology perspective.
Prerequisites: BIOL 451 or GEN 320/BIMS 320/BIMS 320/GEN 320 or equivalent; STAT 651 or equivalent; or approval of instructor.

VTTP 639 Non-Coding RNAs
Credits 3. 3 Lecture Hours.
Roles of non-coding RNAs in regulating gene expression for physiological functions, development and diseases; includes a brief history of the field, various categories and definitions of non-coding RNAs, research methodologies and animal models, and break-through advances in clinical applications.
Prerequisite: Approval of instructor.

VTTP 650 Stem Cell Biology
Credits 3. 3 Lecture Hours.
Wide-range of topics related to stem cells and tissue engineering, including a brief history of the field, various categories and definitions of stem cells, research methodologies and animal models, as well as break-through advances in the area of engineered stem cells.
Prerequisite: Approval of instructor.

VTTP 651 Epigenetics & Systems Physiology
Credits 3. 3 Lecture Hours.
Epigenetics & Systems Physiology. Journal club format focusing on epigenetic regulation of physiological systems; assignment of papers from primary literature and weekly oral presentations detailing opinions on research; emphasis on fundamental concepts in epigenetics, physiology and the molecular techniques employed to address research hypotheses, discussions of scientific ethics and fraud.
Prerequisite: Graduate classification.

VTTP 652 Fetal and Embryo Physiology
Credits 3. 3 Lecture Hours.
Introduction to the physiologic processes driving embryonic development and pregnancy; focus on embryo implantation, establishment of the placenta, development of the fetal circulatory systems and the molecular processes governing embryo differentiation and development; special emphasis on the major organ systems affected by pediatric disease and on the actions of teratogens.
Prerequisites: Graduate classification.

VTTP 653 Endocrinology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Physiology, biochemistry and pharmacology of the endocrines. Laboratory emphasizes a number of classical experiments with clinical application.
Prerequisite: Approval of instructor.

VTTP 654 Molecular Endocrinology
Credits 3. 3 Lecture Hours.
Structure-function relationships of hormones, their receptors and biologic activities.
Prerequisites: VTTP 653 or BIOL 649 and BICH 410 or equivalent approval of instructor.
Prerequisite: Evaluation, and communication of rationales to other scientists.

VTTP 655 Vascular Physiology
Credits 4.4 Lecture Hours.
Structure and function of blood vessels and vascular beds; molecular and cell biology of endothelium and vascular smooth muscle; microcirculation; capillary exchange; regulation of blood flow by local, neural and humoral signals.
Prerequisite: MPHY 901 or approval of department head.

VTTP 656 Physiology of the Heart
Credits 4.4 Lecture Hours.
Structure and function of the heart; molecular and cell biology of cardiac myocytes; electrophysiology of myocardium, pacemaker cells and conducting tissue; cardiac mechanics; control of cardiac performance; coronary circulation.
Prerequisite: MPHY 901 or MPHY 604 or approval of department head.

VTTP 657 Cardiovascular Physiology
Credits 4.3 Lecture Hours. 3 Lab Hours.
Physiological considerations of the circulatory system including general and integrative aspects of the heart and blood vessels.
Prerequisites: Approval of instructor.

VTTP 659 Gamete and Embryo Physiology
Credits 3.2 Lecture Hours. 2 Lab Hours.
Physiology of gametes and preimplantation embryos in livestock and laboratory animals; oocyte growth and maturation in-vivo and in-vitro, fertilization in-vivo and in-vitro, embryo transfer, cryopreservation, nuclear transfer, chimera formation, gene transfer.

VTTP 667 Current Topics in Pharmacology
Credits 3.3 Lecture Hours.
Discussions of literature regarding topics of current research interest; physiochemical or physiologic effects of drugs at sites from molecular to whole body.
Prerequisite: Approval of instructor.

VTTP 673 Metabolic and Detoxication Mechanisms
Credits 3.3 Lecture Hours.
Fate of foreign compounds; their inhibitory and antagonistic action toward normal metabolic processes of the animal body.
Prerequisites: BICH 603; approval of instructor and department head.

VTTP 675 Industrial and Environmental Toxicology
Credits 3.3 Lecture Hours.
Fundamentals of toxicology and risk assessment; effects of selected classes of hazardous chemicals encountered in the workplace or environment on human health will be considered.
Prerequisite: Approval of instructor.

VTTP 676 Genetic and Molecular Toxicology
Credits 3.3 Lecture Hours.
Mechanisms of toxicant-induced target organ toxicity with emphasis on molecular control of mammalian and cell growth differentiation.
Prerequisite: Graduate course in cell biology and biochemistry.

VTTP 677 Fluorescence Detection: Steady State, Time Resolved and Imaging
Credits 4.4 Lecture Hours.
Fluorescence spectroscopy and confocal/multiphoton microscopy in research; intro of pharmacology, life science, and physical science students to fluorophores, anisotropy, ligand binding, energy transfer, cytometry, lifetime imaging, correlation spectroscopy, immunocytochemistry, and image analysis with an emphasis on instrumental/sample artifacts, fluorescence application, literature evaluation, and communication of rationales to other scientists.
Prerequisite: General chemistry and biology course.

VTTP 681 Seminar
Credit 1.1 Lecture Hour.
Review and discussion of current scientific work in physiology and related subjects.
Prerequisite: Approval of department head.

VTTP 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Problems in physiology, pharmacology or toxicology.
Prerequisite: Approval of instructor.

VTTP 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of veterinary physiology and pharmacology. May be repeated for credit.
Prerequisite: Approval of instructor.

VTTP 690 Theory of Research
Credits 3.3 Lecture Hours.
Theory and design of research related to current biomedical problems especially those involving study of animal disease; philosophical perspectives underlying historical advances in research pertaining to the study, prevention and treatment of disease.
Prerequisite: Graduate classification.
Cross Listing: VIBS 690 and VPAT 690.

VTTP 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Original investigations in veterinary physiology, pharmacology or toxicology to be submitted by writing of thesis or dissertation as partial fulfillment for MS or PhD degree.
Prerequisite: Approval of department head.

VTTP 910 Physiology I
Credits 6.5 Lecture Hours. 2 Lab Hours.
Introduction to physiology: cell physiology, cell signaling, cell cycle, body fluids, translocation of materials, membrane potentials, neurophysiology, autonomic nervous system, thermoregulation, cardiovascular, and muscle physiology.
Prerequisite: Enrollment in first year of professional curriculum.

VTTP 912 Physiology II
Credits 6.5 Lecture Hours. 2 Lab Hours.
Blood and lymph, respiration, renal physiology, and acid-base balance, gastrointestinal physiology, metabolism, endocrinology, and reproduction.
Prerequisite: Enrollment in the first year of professional curriculum.

VTTP 924 Pharmacology/Toxicology I
Credits 5.4 Lecture Hours. 2 Lab Hours.
Pharmacokinetics, pharmacodynamics, CNS pharmacology, autonomic pharmacology, antineoplastic agents, immunopharmacology, recombinant products, fluid and electrolyte therapy, diuretics, pharmacology of the integument.
Prerequisite: Enrollment in the second year of professional curriculum.

VTTP 925 Pharmacology/Toxicology II
Credits 3.5 Lecture Hours. 2 Lab Hours.
Antimicrobials, endocrine pharmacology, eicosanoids, antiinflammatory agents, respiratory pharmacology, anticoagulants and hematinics, GI pharmacology, cardiovascular pharmacology.
Prerequisite: Enrollment in the second year of professional curriculum.
VTTP 926 Pharmacology/Toxicology III
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Management and treatment of toxicooses, antidotal pharmacology, toxic plants, mycotoxins and mycotoxicoses, chemical toxicants, metals, euthanasia.
Prerequisite: Enrollment in the second year of professional curriculum.
VTTP 948 Didactic Elective in Veterinary Physiology and Pharmacology
Credits 1 to 12. 1 to 12 Lecture Hours.
Elective course in physiology and pharmacology for professional students who wish to supplement required curriculum. May be repeated for credit.
Prerequisite: Enrollment in the fourth year of professional curriculum.
VTTP 985 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed, individual study of selected problems in physiology, pharmacology or toxicology. May be repeated for credit.
Prerequisite: Approval of instructor and department head.

WFSC-Wildlife & Fisheries Sci

Courses

WFSC 101 Introduction to Wildlife and Fisheries
Credit 1. 1 Lecture Hour.
Introduction to the wildlife and fisheries profession and to alternatives for study in the department.
Prerequisite: Open only to students with less than 36 hours at Texas A&M University. Registration through the Department of Wildlife and Fisheries Sciences only.
WFSC 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in wildlife and fisheries sciences. May be repeated 3 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.
WFSC 300/ENTO 300 Field Studies
Credits 3. 3 Other Hours.
Integration of principles of animal and plant ecology with environmental factors to characterize wildlife populations. Intensive analysis of specific areas will emphasize either the development of a wildlife management plan or a general vertebrate natural history survey.
Prerequisite: Prior approval of instructor.
Cross Listing: ENTO 300/WFSC 300.*
WFSC 301 Wildlife and the Changing Environment
Credits 3. 3 Lecture Hours.
Using an ecosystem approach, analyzes changes in the North American environment; effects of these changes on wildlife populations; and reviews areas of major, current concern.
Prerequisites: Junior or senior classification; restricted to non-majors.
WFSC 302 Natural History of the Vertebrates
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Introduction to life histories of fishes, amphibians, reptiles, birds and mammals; lecture covers vertebrate groups on a worldwide scale and emphasizes a comparative approach to the study of adaptation to the environment; lecture topics include behavior, reproduction, feeding specializations, evolutionary history, locomotion, hibernation, migration, endangered species, zoogeography and importance to man; laboratory emphasizes the recognition of Texas vertebrates. Designed for both science and non-science majors.
Prerequisites: BIOL 111 and BIOL 112 or BIOL 101 and BIOL 107 or equivalent.*
WFSC 303 Fish and Wildlife Laws and Administration
Credits 3. 3 Lecture Hours.
Review and analysis of state and federal laws and international treaties and conventions affecting fish and wildlife; their application and administration; organizational structure of state, federal and international agencies; their objectives, policies and practices.
Prerequisite: RENR 205 or BIOL 357; junior classification. Prerequisite: Junior classification.
WFSC 304 Wildlife and Fisheries Conservation
Credits 3. 3 Lecture Hours.
Ecological principles used to conserve and manage wildlife and fisheries resources at the individual, population and community levels; topics include conservation biology, species interactions, animal-habitat relationships, population dynamics and harvesting, habitat management and restoration and human dimensions of fish and wildlife conservation.
Prerequisites: RENR 205 and junior or senior classification or approval of instructor.*
WFSC 311 Ichthyology
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Introduction to the study of fishes, their biology, classification, evolution, distribution, ecology and economic importance.
Prerequisite: WFSC 302 or BIOL 318.*
WFSC 315 Herpetology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Evolutionary ecology of reptiles and amphibians and conservation biology of the major groups; labs concentrate on the global diversity of herps and the herpetofauna of Texas; foundation for students in wildlife science and biology.
Prerequisites: WFSC 302 or approval of instructor; WFSC 302 or BIOL 318.*
WFSC 316 Field Herpetology
Credits 3. 3 Lecture Hours.
Field work involving collection and preservation of herpetological specimens; natural history, ecological relations. Available for students enrolled in WFSC 315 who would like to have field trips.
Prerequisite: WFSC 315 or registration therein.*
WFSC 327/VTPB 301 Wildlife Diseases
Credits 3. 3 Lecture Hours.
Basic mechanisms of diseases as they occur in wildlife populations; interplay of habitat requirements, individual physiological requirements and disease producing mechanisms of varied wildlife species.
Prerequisite: Junior classification or approval of department head.
Cross Listing: VTPB 301/WFSC 327.*
WFSC 335 Natural History of the Invertebrates  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
A phylogenetic survey of the invertebrate phyla including their taxonomy, morphology, life histories, ecology, ethology and zoogeography. Field trips may be required for which departmental fees may be assessed to cover costs.

WFSC 401 General Mammalogy  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Mammalian biology; evolution, classification, biogeography, reproduction, physiology, ecology, and behavior; focuses on basic concepts necessary for a foundation in both wildlife science and biology.  
Prerequisites: WFSC 302 or BIOL 318; junior classification.*

WFSC 402 General Ornithology  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Introduction to study of birds, their structure, classification, geographic distribution, ecological relations and economic status; foundation of wildlife science, also for museum work.  
Prerequisites: WFSC 302 or BIOL 318; junior classification.*

WFSC 403 Animal Ecology  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Concepts of animal ecology which emerge at various levels of organization; the ecosystem, the community, the population and the individual; laboratories emphasis on the quantitative analysis of field data and the simulation of population dynamics.  
Prerequisites: WFSC 201 and RENR 205 or approval of instructor; junior classification.*

WFSC 404 Aquatic Ecosystems  
Credits 3. 3 Lecture Hours.  
Inland and coastal zone aquatic ecosystems, lower foodweb structure, functioning and influence on living resources; lakes, rivers, estuaries, open bay systems, factors impacting ecosystem health and fisheries; harmful algal blooms, reduced water inflows, eutrophication and hypoxia formation as they affect foodwebs, recruitment of commercially and recreationally important fisheries.  
Prerequisite: Junior or senior classification or approval of instructor.

WFSC 405 Urban Wildlife and Fisheries  
Credits 3. 3 Lecture Hours.  
Urban wildlife and fisheries trains students to establish and maintain diverse, self-sustaining urban wildlife and fish populations at levels in harmony with ecological, social, and economic values of the human community and to develop optimal levels of public appreciation and use of urban wildlife and fish resources and associated habitats.  
Prerequisites: RENR 205; junior or senior classification.

WFSC 406 Conservation Biology and Wildlife Habitat Management  
Credits 3. 3 Lecture Hours.  
Designed to acquaint the student with major land use practices on lands that produce wildlife, how these influence wildlife production and alterations or manipulations of habitat used to achieve specific wildlife management goals.  
Prerequisites: WFSC 201 and WFSC 403; WFSC 401 or WFSC 402; senior classification; wildlife and fisheries sciences major or approval of instructor; concurrent registration in WFSC 407 required.

WFSC 407 Field Wildlife Habitat Management  
Credit 1. 2 Lab Hours.  
Field and laboratory studies of specific wildlife habitat management practices with special emphasis on those used in Texas; attendance required at four weekend field trips to study wildlife habitat operations.  
Prerequisite: Concurrent registration in WFSC 406 required.*

WFSC 408 Techniques of Wildlife Management  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Techniques available to directly and indirectly manipulate wild animal populations to achieve balance between socioeconomic and aesthetic values.  
Prerequisites: Senior classification; WFSC 403 and WFSC 406 or registration therein or approval of instructor.*

WFSC 409 NATURE in the Classroom: Needed Activities To Understand Resource Ecology  
Credit 1. 3 Lab Hours.  
Integration of natural resources through conservation ecology programs, utilization of research techniques adaptable for classroom use; field trips to community facilities, gaming strategies and computer simulations.  
Prerequisites: WFSC 420 or RENR 205 or concurrent enrollment; junior or senior classification.

WFSC 410 Principles of Fisheries Management  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Basic knowledge from ichthyology, biology of fishes and limnology related to applied aspects of freshwater and marine fishery science. Management techniques applicable to streams, ponds, reservoirs, estuaries and the oceans.  
Prerequisites: WFSC 311 and WFSC 414; STAT 302 or concurrent enrollment; or approval of instructor.*

WFSC 414 Ecology of Lakes and Rivers  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Biological, physical, chemical and geological characteristics of fresh waters; human impacts, which include influence of industrial, domestic, conservation and restoration activities.  
Prerequisites: CHEM 101 and CHEM 222; PHYS 201; junior or senior classification.*

WFSC 417 Biology of Fishes  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Fishes’ physiological and morphological adaptations for life in aquatic systems; physiological and behavioral responses of fish to environmental variation. Laboratory emphasizes design, conduct and analysis of virtual experiments featuring “EcoFish,” a simulation model of fish autecology.  
Prerequisites: WFSC 302 or WFSC 311; WFSC 414; or approval of instructor.

WFSC 418 Ecology of the Coastal Zone  
Credits 3. 3 Lecture Hours.  
Introduction to the ecosystems that comprise the coastal zone with an emphasis on the role of freshwater inflows; open bay systems are the focus of lectures, but fringing habitats are also discussed; human components of the coastal zone are also discussed including industrial, commercial domestic, conservation and restoration issues.  
Prerequisite: Junior or senior classification.

WFSC 419 Wildlife Restoration  
Credits 3. 2 Lecture Hours. 3 Lab Hours.  
Study of the fundamentals of the restoration of animal populations and the resources they require; factors that control the distribution and abundances of animals in relation to restoration; and how restoration plans for wildlife are developed.  
Prerequisite: RENR 205 or equivalent; junior or senior classification or approval of instructor; WFSC 406 and WFSC 407 and ESSM 320 preferred.
WFSC 420 Ecology and Society  
Credits 3. 3 Lecture Hours.  
Study and compare human and natural ecosystems using diversity, interrelations, cycles, and energy as the conceptional organization; central themes are sustainability, stewardship and science.  
Prerequisite: Junior or senior classification.

WFSC 422 Ethology  
Credits 3. 3 Lecture Hours.  
Survey of the control, ontogeny, function and natural selection of behavior in a variety of vertebrate and invertebrate species; interaction between the organism and its environment with regard to the mechanisms and adaptive significance of behavior; evolution of anti-predator, feeding, reproductive and cooperative traits.  
Prerequisite: BIOL 112 or equivalent.*

WFSC 423 Aquaculture  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Principles of fish production for stock enhancement and human food. Species of fish used for production, cross-breeding and selection; feeds and feeding of fishes and nutritional and environmental requirements for optimum productivity; effects of fish production on land and water uses as related to conservation.*

WFSC 425 Marine Fisheries  
Credits 3. 3 Lecture Hours.  
Survey of fisheries for marine vertebrates and invertebrates primarily in the Gulf of Mexico and South Atlantic with special emphasis being directed to their biology, economics and management.*

WFSC 426/MARB 426 Aquatic Animal Nutrition  
Credits 3. 3 Lecture Hours.  
Chemistry, digestion, absorption and intermediary metabolism of nutrient classes with special emphasis on their relationship to warmwater fish nutrition; determination of nutrient requirements, feed evaluation, feed processing, ration formulation and feeding practices.  
Prerequisites: CHEM 222; CHEM 227 or equivalent. Taught even years.  
Cross Listing: MARB 426.*

WFSC 427 Disease Management in Fisheries and Aquaculture  
Credits 3. 2 Lecture Hours. 2 Lab Hours.  
Fish and invertebrates of economic importance; factors influencing the maintenance of health for each species group; problems and solutions unique to each phase of aquaculture from breeding to growout; application of routine diagnosis and other management tools.  
Prerequisite: Junior classification.*

WFSC 428 Wetland Ecosystem Management  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Ecosystem approach to the ecology and management of wetlands; emphasis on factors controlling wetland structure and function, characteristics of different wetland types, and applied issues of wetland restoration, creation and delineation.  
Prerequisite: Junior or senior classification.*

WFSC 433 Molecular Ecology in Wildlife and Fisheries  
Credits 3. 3 Lecture Hours.  
Fundamentals of molecular ecology applied to conservation and management of wildlife and fisheries; presentation and discussion of scientific papers on wildlife and fisheries molecular ecology; topics in conservation, management and aquaculture.  
Prerequisites: BIOL 112 or equivalent; junior or senior classification.

WFSC 444 Aquaculture I: Principles and Practices  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Scientific perspectives concerning major principles associated with fish production under controlled conditions; production techniques associated with prominent species produced via aquaculture throughout the world with emphasis on those cultured in the United States.  
Prerequisite: Junior or senior classification or approval of instructor.

WFSC 447 Aquaculture II: Aquatic Animal Nutrition, Feeding and Disease Management  
Credits 4. 3 Lecture Hours. 3 Lab Hours.  
Review of scientific perspectives on major aspects of nutrition, diet formulation and feeding of aquatic species in aquaculture; major disease-causing organisms encountered in aquaculture and means of disease prevention and control.  
Prerequisite: Junior or senior classification or approval of instructor.

WFSC 448 Fish Ecophysiology  
Credits 3. 3 Lecture Hours.  
Ecological domains and demands placed on physiological performance; physiological mechanisms and control in fishes, interaction of physiological mechanisms with environment, emphasis in adaptive value of physiological traits; analysis of physiology and adaptation with models; process and functional modeling.  
Prerequisite: WFSC 311 or concurrent enrollment, junior or senior classification or approval of instructor.

WFSC 449 Professional Aspects of Aquatic Ecology  
Credits 3. 3 Lecture Hours.  
Discipline of aquatic sciences through oral presentation and written documentation; job market expectations, resume preparation, job application, and preparation for and giving an interview.  
Prerequisite: Junior or senior classification or approval of instructor.

WFSC 450/ENTO 450 Caribbean Conservation  
Credits 2. 6 Lab Hours.  
Provide experience in and appreciation for diverse tropical habitats and the problems associated with conserving these habitats; design and conduct individual research projects on topics of their choice with approval from the instructors on project design and feasibility.  
Prerequisites: Concurrent enrollment in ENTO 300/WFSC 300 and ENTO 451/WFSC 451; junior or senior classification.  
Cross Listing: ENTO 450/WFSC 450.

WFSC 451/ENTO 451 Caribbean Research Seminar  
Credit 1. 1 Other Hour.  
Document research activities; keep a journal of activities and research methods during study abroad trips.  
Prerequisites: Concurrent enrollment in ENTO 300/WFSC 300 and ENTO 450/WFSC 450; junior or senior classification.  

WFSC 454 Amazon Field School  
Credits 4. 4 Lecture Hours.  
Investigation of social and ecological complexities of biodiversity conservation in tropical ecosystems; biological and social science approaches to evaluate causes, consequences and solutions to biodiversity loss through ecology, culture and governance.  
Prerequisites: Junior or senior classification with a minimum GPA of 2.0 and approval of instructor.  
Cross Listing: RPTS 454 and VTPB 404.
WFSC 481 Seminar
Credit 1. 1 Lecture Hour.
Oral discussion of selected topics from technical literature on recent advances in the field.
Prerequisites: Senior classification in wildlife and fisheries sciences; 6 hours of 300- or 400-level wildlife and fisheries sciences courses. May be repeated for credit.

WFSC 484 Internship
Credits 1 to 9. 1 to 9 Other Hours.
Practical experience working in a professional wildlife or fisheries facility.
Prerequisite: Approval of department head.

WFSC 485 Directed Studies
Credits 1 to 3. 1 to 3 Other Hours.
Individual study and research on selected problem approved by instructor and academic advisor.
Prerequisites: Junior or senior classification; approval of department head.

WFSC 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of wildlife and fisheries sciences. May be repeated for credit.
Prerequisite: Approval of department head.*

WFSC 491 Research
Credits 1 to 6. 1 to 6 Other Hours.
Laboratory and/or field research supervised by a faculty member in wildlife and fisheries sciences. Registration in multiple sections of this course are possible within a given semester provided that the per semester credit hour limit is not exceeded.
Prerequisites: Junior or senior classification; approval of department head.

WFSC 602 Field Herpetology
Credit 1. 3 Lab Hours.
Field work involving collection and preservation of herpetological specimens; natural history, ecological relations.
Prerequisites: Graduate classification.*

WFSC 603 History of Ecological Thought and Conservation Practice
Credits 3. 3 Lecture Hours.
Survey of the philosophical roots and evolution of ecological thought and conservation practice; emphasis on theoretical foundations, seminal concepts, classic papers, and historic trends.
Prerequisites: Course in general ecology and graduate classification or instructor approval.

WFSC 604 Ecological Modeling
Credits 3. 3 Lecture Hours.
Philosophical basis, theoretical framework, and practical application of systems analysis and simulation within the context of ecology and natural resource management; emphasis placed on development, evaluation and use of simulation models by students.
Prerequisite: Approval of instructor.

WFSC 605 Community Ecology
Credits 3. 3 Lecture Hours.
Overview and in-depth knowledge of community ecology; historical development; current issues, methodologies, and practical applications in natural resource management, biological conservation, agriculture, and human health; practice critical thinking, communication skills, and professionalism.
Prerequisite: Graduate classification.

WFSC 607 Environmental Conflict Management
Credits 3. 3 Lecture Hours.
Understand environmental conflict systemically, understand how communication contributes to environmental conflict and develop increased capacity as managers of environmental conflict.
Prerequisite: Graduate classification or approval of instructor.

WFSC 608 Public Participation in Conservation Policy
Credits 3. 3 Lecture Hours.
Students will have the opportunity to become familiar with and critique theories and constructs as well as strategies and techniques for enhancing public participation in environmental conservation policy.
Prerequisite: Graduate classification or approval of instructor.

WFSC 609 Wildlife Research Methods
Credits 3. 3 Lecture Hours.
Research methods for ecology and conservation; become familiar with the philosophy of natural science and develop skill in study design, grantsmanship, presentation techniques, critical evaluation of others’ work, and publication in refereed journals.
Prerequisites: Courses in general ecology and statistics and graduate classification or approval of instructor.

WFSC 610 Evolutionary Ecology
Credits 3. 3 Lecture Hours.
Survey the development of paradigms in evolutionary ecology; incorporates phylogenies into comparative analysis and macroecology; evaluates the roles of historical and local processes in determining species diversity.
Prerequisite: Graduate classification.

WFSC 611 Estuarine Ecology
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Principles governing the relationships of estuarine organisms to their environment; productivity, adaptations to environment, community structure and factors affecting the distribution and abundance of biota.
Prerequisite: Invertebrate zoology and ichthyology or approval of instructor.

WFSC 613 Animal Ecology
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Concepts of animal ecology which emerge at various levels or organization; the ecosystem, the community, the population and the individual; laboratories emphasis on the quantitative analysis of field data and the simulation of population dynamics.
Prerequisite: Graduate classification or approval of instructor.*

WFSC 617 Biology of Fishes
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Fishes' physiological and morphological adaptations for life in aquatic systems; physiological and behavioral responses of fish to environments; molecular, cellular, and physiological mechanisms discussed in an evolutionary context that emphasizes the ontogeny of adaptive responses among vertebrates from basic biochemical and biophysical constraints.
Prerequisite: Graduate classification or approval of instructor.

WFSC 618 Wildlife Study Design and Analysis
Credits 3. 3 Lecture Hours.
Fundamental and advanced aspects of study design applicable to terrestrial animals; analysis and review of the scientific literature related to study design; and the development of study design for written and oral presentations.
Prerequisite: Graduate classification or approval of instructor.
WFSC 619 Wildlife Restoration
Credits 3.2 Lecture Hours. 3 Lab Hours.
Study of the fundamentals of the restoration of animal populations and the resources they require; factors that control the distribution and abundances of animals in relation to restoration; and how restoration plans for wildlife are developed.
Prerequisite: Graduate classification or approval of instructor.

WFSC 620 Vertebrate Ethology
Credits 4.3 Lecture Hours. 2 Lab Hours.
Mechanisms and control of vertebrate behavior in an ecological context, as shaped by natural selection; classical and current theories regarding the genetic basis, development, specialized sensory systems and organization of responses in changing environment; laboratory emphasizes observational skills and quantitative analysis of behavior occurring in natural settings.*

WFSC 622 Behavioral Ecology
Credits 3.3 Lecture Hours.
Integration of animal behavior with ecological and evolutionary principles; includes mating, predation, foraging ecology, social behavior, game theory and behavioral genetics; emphasis on quantification of behavior and strategy modeling.
Prerequisites: Undergraduate ecology course; graduate classification.

WFSC 623 Aquaculture
Credits 4.3 Lecture Hours. 3 Lab Hours.
Principle of fish production for stock enhancement and human food. Species of fish used for production, cross-breeding and selection; feeds and feeding of fish and nutritional and environmental requirements for optimum productivity; effects of fish production on land and water uses as related to conservation.
Prerequisite: Graduate classification or approval of instructor.

WFSC 624 Dynamics of Populations
Credits 4.3 Lecture Hours. 2 Lab Hours.
Principles, models and methods for analysis of population dynamics; analysis of contemporary research emphasizing theory and its uses in evaluation and management of animal populations. Laboratory emphasizes mathematical, statistical and computer modeling of population phenomena.

WFSC 628 Wetland Ecology and Pollution
Credits 3.3 Lecture Hours.
Wetlands as ecological systems that are prime habitats for wildlife and fish; geomorphology, hydrology, limnology, plant and animal communities, and humans use and management; wetlands as ultimate reservoirs of environmental pollutants; distribution, fate and effects of environmental pollutants on aquatic and terrestrial wildlife.
Prerequisite: Graduate classification or approval of instructor.

WFSC 630 Ecology and Society
Credits 3.3 Lecture Hours.
Study and compare human and natural ecosystems using diversity, interrelations, cycles, and energy as the conceptual organization; central themes of the course are sustainability, stewardship and science.
Prerequisite: Graduate classification or approval of instructor.

WFSC 632 Ethology
Credits 3.3 Lecture Hours.
Survey of the control, ontogeny, function and natural selection of behavior in a variety of vertebrate and invertebrate species; interaction between the organism and its environment with regard to the mechanisms and adaptive significance of behavior; evolution of anti-predator, feeding, reproductive and cooperative traits.
Prerequisites: BIOL 112 or equivalent; graduate classification.

WFSC 633/GENE 633 Conservation Genetics
Credits 3.3 Lecture Hours.
Genetic concepts and techniques relevant to management and conservation of biological diversity, research and conservation strategies within a conservation genetics framework.
Prerequisite: Introductory courses in genetics and ecology or biological conservation.
Cross Listing: GENE 633/WFSC 633.

WFSC 635 Urban Wildlife and Fisheries
Credits 3.3 Lecture Hours.
Urban wildlife and fishery students to establish and maintain diverse, self-sustaining urban wildlife and fish populations at levels in harmony with ecological, social, and economic values of the human community and to develop optimal levels of public appreciation and use of urban wildlife and fish resources and associated habitats.
Prerequisite: Graduate classification or approval of instructor.

WFSC 636 Wildlife Habitat Management
Credits 3.3 Lecture Hours.
Designed to acquaint with major land use practices on lands that produce wildlife, how these influence wildlife production and alterations or manipulations of habitat used to achieve specific wildlife management goals.
Prerequisite: Graduate classification or approval of instructor.*

WFSC 638 Techniques of Wildlife Management
Credits 3.2 Lecture Hours. 3 Lab Hours.
Techniques available to directly and indirectly manipulate wild animal populations to achieve balance between socioeconomic and aesthetic values.
Prerequisite: Graduate classification or approval of instructor.*

WFSC 639 Wildlife Ecotoxicology
Credits 3.3 Lecture Hours.
Distribution, fate, and effects of environmental pollutants on wildlife behavior and reproduction. Global distribution of pollutants and effects on near and remote ecosystems. Field studies, biomarkers, stable isotope and various techniques for evaluating pollutant hazards on wildlife.
Prerequisites: Courses in CHEM and BICH and graduate classification or approval of instructor.

WFSC 640 Human Dimensions of Wildlife and Fisheries Management
Credits 3.3 Lecture Hours.
Theory and applications for considering human dimensions in an integrated approach to wildlife and fisheries management; a social science perspective with emphasis to diversity of human values, role of constituency groups, wildlife and fisheries policy development, conflict management, management decision-making, research methods and management case studies.

WFSC 641 Sustainable Military Land Management
Credits 3.3 Lecture Hours.
Overview of the Department of Defense (DOD) lands within a temporal, geographic, and environmental context and perspective; major policies/ laws impacting military land use and areas critical to mission sustainment; management strategies important to sustaining installations and ranges.
Prerequisite: Graduate classification or approval of instructor.

WFSC 642 Field Military Land Management
Credit 1.0 Lecture Hours. 2 Lab Hours.
Review of land management practices and challenges on military and adjacent private lands through field visits of select military installations. Field trips required during Spring Semester.
Prerequisite: Graduate classification or approval of instructor. Previous or concurrent registration in WFSC 636 is strongly encouraged.
WFSC 643 Geospatial Technology in Military Land Management
Credits 3. 3 Lecture Hours.
Tools for visualizing, creating, managing and analyzing geographic data on military lands and outside areas critical to mission sustainment; familiarity with ArcMap and ArcCatalog in military-related land management scenarios.
Prerequisites: Graduate classification or approval of instructor; previous experience with ArcMap and ArcCatalog helpful.

WFSC 646 Quantitative Phylogenetics
Credits 3. 2 Lecture Hours. 1 Lab Hour.
Designed to provide the theory and tools required for inference of phylogenetic (evolutionary) relationships among biological taxa using various types of comparative data including morphological characters, biochemical and molecular characters, and DNA sequences; hands-on analysis of data using contemporary tools.
Prerequisites: ENTO 601 or approval of instructor.
Cross Listing: ENTO 606 and GENE 660.

WFSC 647/NUTR 647 Nutritional Biochemistry of Fishes
Credits 3. 3 Lecture Hours.
Principles of nutritional biochemistry including nutrient metabolism and biochemical energetics with special emphasis on finfish and shellfish.
Prerequisite: BICH 410 or equivalent.
Cross Listing: NUTR 647/WFSC 647.

WFSC 648/GENE 648 Molecular Evolution
Credits 3. 2 Lecture Hours. 1 Lab Hour.
Theory and tools used in the analysis of molecular evolutionary patterns of DNA and protein sequences; format combines lecture presentations by instructor discussion of relevant scientific literature, computer exercises, preparation of research proposal or independent research project, and practice in peer-review process.
Prerequisite: Basic courses in general Genetics and Evolution.
Cross Listing: GENE 648/WFSC 648.

WFSC 649 Principles of Fisheries Management
Credits 4. 4 Lecture Hours.
Basic knowledge of ichthyology, biology of fishes and limnology related to applied aspects of freshwater and marine fishery science; management techniques applicable to streams, ponds, reservoirs, estuaries and the oceans.
Prerequisite: Graduate classification.

WFSC 654 Amazon Field School
Credits 4. 4 Lecture Hours.
Investigation of social and ecological complexities of biodiversity conservation in tropical ecosystems; biological and social science approaches to evaluate causes, consequences and solutions to biodiversity loss through ecology, culture and governance.
Cross Listing: RPTS 654 and VTMI 604.

WFSC 655/RPTS 655 Applied Biodiversity Science I
Credits 3. 3 Lecture Hours.
Applied Biodiversity Science. Students will study in the areas of Conservation genetics, metapopulations, landscape ecology, and ecosystem management.
Prerequisite(s): Graduate classification.
Cross Listing: RPTS 655/WFSC 655.

WFSC 670 Excel Biometry
Credits 3. 3 Lecture Hours.
Rational and mathematics behind upper level biometrical methods; construct spreadsheets and analyze a common data set; topics include multiple regressions, principle components analysis, multivariate analysis of variance and others.
Prerequisites: Graduate classification; STAT 651 or equivalent.

WFSC 681 Seminar
Credit 1. 1 Lecture Hour.
Important current developments in wildlife or fisheries fields with special reference to literature. Students may register up to but no more than two sections of this course in the same semester.

WFSC 684 Professional Internship
Credits 1 to 16. 1 to 16 Other Hours.
On-the-job training in fields of wildlife and fisheries sciences.
Prerequisite: Graduate classification in Wildlife and Fisheries Sciences.

WFSC 685 Directed Studies
Credits 1 to 6. 1 to 6 Other Hours.
Individual study and research on selected problem approved by instructor and graduate advisor.
Prerequisite: Approved proposal.

WFSC 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Special topics in wildlife ecology, fisheries ecology, vertebrate systematics, evolutionary biology of vertebrates and conservation education. May be repeated for credit.*

WFSC 691 Research
Credits 1 to 23. 1 to 23 Other Hours.
Original research on selected wildlife and/or fisheries problem to be used in thesis or dissertation.

WGST -Women's & Gender Studies

Courses

WGST 200 Introduction to Women's and Gender Studies
Credits 3. 3 Lecture Hours.
Historical and cross-cultural perspectives on women's roles in culture, the workplace, the family and other socio-political institutions; the social construction of gender; sexuality and racism; social control mechanisms and ideologies.

WGST 207/SOCI 207 Introduction to Gender and Society
Credits 3. 3 Lecture Hours.
Similarities and differences between females and males in a number of cultures throughout the world; sociological analysis of gender in relation to social structure.
Cross Listing: SOCI 207/WGST 207.

WGST 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of women's/gender studies. May be repeated for credit.
Prerequisite: Approval of director.
WGST 291 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the direction of faculty member in women's and gender studies. May be repeated 3 times for credit.
Prerequisites: 3 credits in WGST; freshman or sophomore classification and approval of instructor.

WGST 300/PSYC 300 Psychology of Women
Credits 3. 3 Lecture Hours.
Theoretical and research literature relevant to psychological assumptions about the female personality; challenges to and verification of these assumptions by recent experimental studies.
Prerequisite: PSYC 107.
Cross Listing: PSYC 300/WGST 300.

WGST 302 Women and Religion
Credits 3. 3 Lecture Hours.
Investigation of women's position in religious institutions historically and/or currently, religion's influence on women's roles and status, and women's attempts to define their own religious perspectives; draws on sociological and philosophical insights and methods.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: RELS 302 and SOCI 302.

WGST 303 Psychology of Women of Color
Credits 3. 3 Lecture Hours.
Interdisciplinary theories to study the unique yet intersectional experiences of women from different racial groups, ethnicities, nationalities and cultural backgrounds; scholarly research from the diversity science field; contemporary topics that have developed in a global context; examination of complex issues, which affect women of color across the lifespan.
Prerequisite: Grade of C or better in AFST 201 or PSYC 107 or WGST 200, or approval of instructor.
Cross Listing: AFST 303 and PSYC 303.

WGST 307 Gender and Education
Credits 3. 3 Lecture Hours.
Overview of gender and education; role of feminism and feminist theory; intersections of gender, race, class, ethnicity, and sexuality.
Prerequisite: Junior or senior classification.

WGST 308 Gender and International Education
Credits 3. 3 Lecture Hours.
Exploration of the intersection of formal and informal education and understandings of gender in countries beyond the United States.
Prerequisites: WGST 307; junior or senior classification.

WGST 309 Feminist Pedagogy
Credits 3. 3 Lecture Hours.
Exploration of educational systems' and institutions' regard for women historically and contemporarily; practical and theoretical writings on feminist pedagogy.
Prerequisites: WGST 307; junior or senior classification.

WGST 310/SOCI 310 Motherhood in Society
Credits 3. 3 Lecture Hours.
Examines expectations and/or practices relating to motherhood, with consideration of their cultural impact; taught from a social science perspective.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: SOCI 310/WGST 310.

WGST 315/SOCI 315 The Marriage Institution
Credits 3. 3 Lecture Hours.
Courtship, engagement, marriage, family formation, personal adjustment, conflict, financing and child rearing.
Prerequisite: Junior or senior classification.
Cross Listing: SOCI 315/WGST 315.

WGST 316/SOCI 316 Sociology of Gender
Credits 3. 3 Lecture Hours.
Sociological explanations of status differences between men and women; cross-cultural comparisons; gender role socialization, cultural stereotypes, discrimination; gender roles and status in the family, economy, religion, science, other social institutions; deviance, victimization and gender; recent social changes.
Cross Listing: SOCI 316/WGST 316.

WGST 317/POLS 317 Women in Politics
Credits 3. 3 Lecture Hours.
Role of women in the political system; treatment of women in political theory; effect of law on women's status; women as political leaders; current policy issues of concern to women.
Prerequisite: POLS 206.
Cross Listing: POLS 317/WGST 317.

WGST 318/ECON 318 The Economics of Gender and Race
Credits 3. 3 Lecture Hours.
Theories and evidence on gender and race differences in labor market outcomes; labor supply and the role of family formation; the effect of human capital and discrimination on earnings; analysis of government policies; international comparisons.
Prerequisites: 6 hours drawn from the following: ECON 202, STAT 303, 3 hours in WGST above 200 level; junior or senior classification.
Cross Listing: ECON 318/WGST 318.

WGST 330 Women in Ancient Greece and Rome
Credits 3. 3 Lecture Hours.
Survey of women in classical Greece and Rome; emphases on female occupations and family relationships, legal and political status, traditional values, notorious women, how women were viewed and how they viewed themselves.
Prerequisite: Junior or senior classification.
Cross Listing: CLAS 330 and HIST 330.

WGST 332/SOCI 332 Alternative Genders
Credits 3. 3 Lecture Hours.
Examination of theories and case studies involving alternative genders and sexualities, studied in their cultural contexts and including the role of factors such as race, class, ethnicity, age, and physical characteristics.
Prerequisites: 3 credits in SOCI or WGST; junior or senior classification.
Cross Listing: SOCI 332/WGST 332.

WGST 333/ENGL 333 Gay and Lesbian Literature
Credits 3. 3 Lecture Hours.
Gay and lesbian literature from classical times to present, studied in its historical and cultural context.
Prerequisite: Junior or senior classification. Prerequisite: Junior or senior classification.
Cross Listing: ENGL 333/WGST 333.
WGST 334/HLTH 334 Women's Health
Credits 3. 3 Lecture Hours.
A broad range of health issues that are either unique to women or of special importance to women; information for the health consumer; preparation as an advocate of healthy lifestyles; awareness of the role health plays in the life of all women.
Prerequisite: Junior or senior classification.
Cross Listing: HLTH 334/WGST 334.

WGST 343/FILM 343 Sex, Gender and Cinema
Credits 3. 3 Lecture Hours.
Exploration of a significant topic at the intersection of women's/gender studies and film, such as cinema and sexuality studies, cinema and women, and cinema and masculinity; may include discussion of production, film content, and/or reception.
Prerequisites: 3 hours in FILM or WGST; junior or senior classification or approval of instructor.
Cross Listing: FILM 343/WGST 343.

WGST 367/POLS 367 Women in Government in Comparative Perspective
Credits 3. 3 Lecture Hours.
Examination of women's representation in government based on comparison across multiple nation-states; focus on legislative and executive branches of democratic governments.
Prerequisites: POLS 206; junior or senior classification or approval of political science department head.
Cross Listing: POLS 367/WGST 367.

WGST 374/ENGL 374 Women Writers
Credits 3. 3 Lecture Hours.
History of literature by women in English; emphasis on continuity of ideas and on literary contributions; study of a variety of genres with particular attention to the significance of gender in the racial, social, sexual and cultural contexts of women writing in English.
Prerequisite: Junior or senior classification.
Cross Listing: ENGL 374/WGST 374.

WGST 391 Studies in Gender and Diversity
Credits 3. 3 Lecture Hours.
Exploration of a significant topic in gender studies, emphasizing the interplay of gender with one or more races, ethnicities, and/or cultures beyond the Anglo-American.
Prerequisite: Junior or senior classification.

WGST 401 Feminist Theory
Credits 3. 3 Lecture Hours.
Inquiry-based examination of feminist theory from various periods and disciplinary perspectives, with application to societal debates and controversies.
Prerequisites: WGST 200 or approval of instructor; junior or senior classification.

WGST 403 Language and Gender
Credits 3. 3 Lecture Hours.
Language and gender from a sociolinguistic perspective; gender in the words and structures of language; gender representation and gendered language use in the media, and a variety of sociocultural contexts; language use in intimate relationships; computer-mediated discourse; language, sexuality, and sexual orientation.
Prerequisite: Junior or senior classification.
Cross Listing: ENGL 403 and LING 403.

WGST 404/ANTH 404 Women and Culture
Credits 3. 3 Lecture Hours.
Examines women's lives in evolutionary and cross-cultural perspective; women's roles in subsistence, politics, religion and economics in traditional cultures; women's roles in international development; the cultural and social construction of women's biology cross-culturally including circumcision, menstruation, pregnancy, childbirth and motherhood.
Cross Listing: ANTH 404/WGST 404.

WGST 407/COMM 407 Women, Minorities and the Mass Media
Credits 3. 3 Lecture Hours.
The contributions of women and ethnic groups to the evolution of the media; the portrayal of women and ethnic groups in the mass media; issues resulting from the recognition of women and ethnic groups as media audiences.
Prerequisite: Junior classification or approval of instructor.

WGST 409/PHIL 409 Studies in Gender and Philosophy
Credits 3. 3 Lecture Hours.
Analysis, from a gender-studies perspective, of a single figure or concept in the history of philosophy. May be repeated 1 time for credit with a different focus.
Prerequisites: 3 hours in philosophy and women's and gender studies; junior or senior classification.
Cross Listing: PHIL 409/WGST 409.

WGST 411/COMM 411 Representations of Motherhood
Credits 3. 3 Lecture Hours.
Examination of understandings of motherhood from a humanities perspective and over a variety of cultures and time periods, as reflected in written, media and/or oral texts.
Prerequisites: Junior or senior classification or approval of instructor.
Cross Listing: COMM 411/WGST 411.

WGST 420/COMM 420 Gender and Communication
Credits 3. 3 Lecture Hours.
Survey of the role of gender in communication processes; focus on communication differences between men and women in contexts such as the family, school and work organizations; discussion of media influence in gender stereotypes.
Cross Listing: COMM 420/WGST 420.

WGST 422/FREN 422 Studies in Gender and French Literature
Credits 3. 3 Lecture Hours.
The role of gender in production, dissemination, reception and interpretation of literary texts in the French tradition, including continental France as well as the Francophone literatures of West Africa, Canada, and elsewhere; taught in English.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: FREN 422/WGST 422.

WGST 424/SOCI 424 Women and Work in Society
Credits 3. 3 Lecture Hours.
Social context of women's work; work patterns, labor force participation, occupational destinations and occupational mobility; alternatives to the conventional division of labor by sex in society.
Cross Listing: SOCI 424/WGST 424.
WGST 428/COMM 428 Women’s Rhetoric
Credits 3.3 Lecture Hours.
Examination of the historical imbrication of masculinity and rhetoric in relation to women’s participation in political life, reception of women’s rhetoric in the public sphere, and remembrance and representation of women as rhetorical agents throughout history; consideration of women’s rhetoric in various cultural arenas.
Prerequisite: Junior or senior classification.
Cross Listing: COMM 428/WGST 428.

WGST 430/MGMT 430 Employment Discrimination Law
Credits 3.3 Lecture Hours.
Legal issues surrounding employment discrimination, including disparate treatment and impact; intent; affirmative action; sexual harassment; pregnancy, sex, race, religious, salary, disability, age, and ethnic discrimination; policy issues and perspectives to aid human resource specialists and managers.
Prerequisite: Junior or senior classification.
Cross Listing: MGMT 430/WGST 430.

WGST 439/ANTH 439 Gender, Ethnicity and Class in Archaeological Research
Credits 3.3 Lecture Hours.
Exploration of theoretical and methodological issues in engendering archaeology; ideological biases in the interpretation of roles attributed to women, men, and underrepresented groups in the past; the impact of cultural transformation on underrepresented groups and gender relations; and the formulation of research questions concerning these issues.
Prerequisites: ANTH 202, ANTH 210, WGST 200 or WGST 207/SOCI 207; junior or senior classification or approval of instructor.
Cross Listing: ANTH 439/WGST 439.

WGST 445 Queer Theory
Credits 3.3 Lecture Hours.
Examines origins of theories of gender and sexual diversity and their intersections with feminist theories; considers foundational and contemporary texts that address queer theory.
Prerequisites: 6 hours in Women’s and Gender Studies; senior classification or approval of instructor.

WGST 452/ITAL 452 Women and Gender in Italian Literature
Credits 3.3 Lecture Hours.
The historical and cultural dynamics forging the notion of woman and gender in Italian society and literature; discussion of films and theoretical texts concerning subjectivity and language, body and culture; taught in English.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: ITAL 452/WGST 452.

WGST 461/HIST 461 History of American Women
Credits 3.3 Lecture Hours.
Cultural, political, legal and religious factors that helped shape the role and character of women in American society from colonial times to the present; historical role of women in the development of the nation.
Cross Listing: HIST 461/WGST 461.

WGST 462/POLS 462 Women and the Law
Credits 3.3 Lecture Hours.
The legal status of American women from the adoption of the Constitution to the present; constitutional developments; the 19th Amendment and the proposed Equal Rights Amendment; employment; family law; reproductive rights; education; sexual equality in context of other claims to equality; law and social norms.
Prerequisite: POLS 206 or approval of department head.
Cross Listing: POLS 462/WGST 462.

WGST 463 Gender in Asia
Credits 3.3 Lecture Hours.
Gender dynamics in Asia; changes in gender roles; women’s movements; women and the economy; women and politics; men’s and women’s private lives.
Prerequisite: Junior or senior classification or approval of instructor.
Cross Listing: ASIA 463 and SOCI 463.

WGST 473/HIST 473 History of Modern American Women
Credits 3.3 Lecture Hours.
Emergence of modern American women in the 1890s; examination of their history from the 1890s to the present; women as organizers, innovators, political reformers, workers, social activists, housewives, mothers, consumers and feminists.
Cross Listing: HIST 473/WGST 473.

WGST 474/ENGL 474 Studies in Women Writers
Credits 3.3 Lecture Hours.
A different topic each term examining women’s writing through historical period, genre, cross-cultural study and/or feminist literary theory. May be repeated for credit.
Prerequisites: 3 credits of literature at the 300-level; junior or senior classification.
Cross Listing: ENGL 474/WGST 474.

WGST 476/HIST 476 Sex and Sexuality in History
Credits 3.3 Lecture Hours.
Changing ideas about sex and sexuality over time; includes their interaction with ideas about gender, race, class, religion, science, technology, medicine, politics and popular culture; historical and cultural processes creating modern concerns about sex and sexuality.
Prerequisite: Junior or senior classification.
Cross Listing: HIST 476/WGST 476.

WGST 477/HIST 477 Women in Modern European History
Credits 3.3 Lecture Hours.
Women in Europe from the 18th century to the present: women’s contributions to their societies; realities of their daily lives and their responses; perceptions of women; role of institutions in defining women’s roles; significance for women of industrialization, revolution, warfare, scientific discoveries; interaction of class, race and gender.
Cross Listing: HIST 477/WGST 477.

WGST 481 Senior Seminar
Credits 3.3 Lecture Hours.
Inquiry-based investigation of an issue, problem, or question, using gender or feminism as the organizing principle for analysis; methods and materials of scholarship in the field; includes opportunities for student research.
Prerequisite: Senior classification or approval of instructor.

WGST 484 Internship in Women’s and Gender Studies
Credits 0 to 4.0 to 4 Other Hours.
Directed internship in a public or private organization to provide students with on-the-job training and applied research experience; opportunity to observe firsthand issues and problems covered in women’s and gender studies courses; designed to enhance and clarify the student’s career objectives.
Prerequisites: 6 hours in women’s and gender studies, junior.

WGST 485 Directed Studies
Credits 0 to 4.0 to 4 Other Hours.
Readings and/or research for specific needs of students majoring or minoring in women’s and gender studies.
Prerequisites: Approval of women’s and gender studies director and faculty supervisor.
WGST 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of women's and gender studies. May be repeated for significant credit.

WGST 491 Research
Credits 0 to 3. 0 to 3 Other Hours.
Research conducted under the direction of faculty member in women's and gender studies. May be repeated 3 times for credit.
Prerequisites: 12 credits in WGST including 6 at 300-level; junior or senior classification and approval of instructor.

WGST 603 The Contemporary Family
Credits 3. 3 Lecture Hours.
Review and criticism of theories developed for study of the family; family formation, dynamics, conflicts, power, dissolution; subcultural family forms and responses to social change.
Prerequisite: Graduate classification or approval of instructor.
Cross Listing: SOCI 603/WGST 603.

WGST 634/EHRD 634 Introduction to Gender and Education
Credits 3. 3 Lecture Hours.
Major discussions and debates in the area of gender and education, with particular attention to the role that feminism and feminist theory have played and on the intersections of gender, race, class, ethnicity, and sexuality.
Prerequisite: Graduate classification.
Cross Listing: EHRD 634/WGST 634.

WGST 639/ANTH 639 Gender, Ethnicity, and Class in Archaeological Research
Credits 3. 3 Lecture Hours.
Explores theoretical and methodological issues in engendering archaeology; ideological biases in the interpretation of roles attributed to women, men and underrepresented groups in the past; the impact of cultural transformations on underrepresented groups and gender relations; and how to formulate research questions concerning these issues.
Prerequisite: Graduate classification.
Cross Listing: ANTH 639/WGST 639.

WGST 645 Queer Theory
Credits 3. 3 Lecture Hours.
Examines origins of theories of gender and sexual diversity and their intersections with feminist theories; considers foundational and contemporary texts that address queer theory.
Prerequisite: Graduate classification.

WGST 649/EHRD 649 Feminist Pedagogy
Credits 3. 3 Lecture Hours.
Explores how educational systems and institutions have regarded women historically and contemporarily; considers practical and theoretical writings on feminist pedagogy.
Prerequisite: EHRD/WGST 634/EHRD 634 Introduction to Gender and Education.
Cross Listing: EHRD 649/WGST 649.

WGST 650/EHRD 650 Gender and International Education
Credits 3. 3 Lecture Hours.
Explores the intersection of formal and informal education and understandings of gender in countries beyond the United States.
Prerequisites: EHRD/WGST 634/EHRD 634 Introduction to Gender and Education.
Cross Listing: EHRD 650/WGST 650.

WGST 652/COMM 656 Feminism and Rhetoric
Credits 3. 3 Lecture Hours.
Historical development of the ideology, theory and rhetorical practices of U.S. feminism; criticism of significant artifacts of women orators and writers from the 19th century to contemporary times.
Cross Listing: COMM 656/WGST 652.

WGST 661/SOCI 661 Sociology of Gender
Credits 3. 3 Lecture Hours.
Overview of the Sociology of Gender, historical development, primary concepts, contemporary issues. Theory, methods, and applications.
Prerequisite: Graduate classification.
Cross Listing: SOCI 661/WGST 661.

WGST 680/ENGL 680 Theories of Gender
Credits 3. 3 Lecture Hours.
Theories of gender, sexualities, feminism, embodiment, and difference with particular focus on their relationship to literary and cultural studies; emphasis on contemporary theoretical positions, discourses, and debates.
Cross Listing: ENGL 680/WGST 680.

WGST 685 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Directed individual study of selected problems in the field of women's and gender studies.
Prerequisite: Approval of instructor.

WGST 689 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of women's and gender studies. May be repeated for credit.
Prerequisite: Approval of instructor.

ZOOL - Zoology

Courses

ZOOL 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of zoology. May be repeated for credit.
Prerequisite: Approval of instructor.

ZOOL 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Active research of basic nature under the supervision of a Department of Biology faculty member.
Prerequisites: Freshman or sophomore classification and approval of instructor.

ZOOL 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of zoology. May be repeated once for credit.

ZOOL 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Active research of basic nature under the supervision of a Department of Biology faculty member.
Prerequisites: Junior or senior classification and approval of instructor.
Faculty

Please visit http://facultycatalog.tamu.edu for a current list of faculty.

Abanov, Artem G, Associate Professor. Physics And Astronomy. PhD, Texas AM University, 1998.

Abbey, James D, Assistant Professor. Information Operations Mgmt. PhD, Pennsylvania State University, 2013.


Abedi Mashhadimighani, Sara, Assistant Professor. Petroleum Engineering. PhD, University of Southern California, 2012.

Abouassi, Khalid, Assistant Professor. Public Service Administration. PhD, Syracuse University, 2012.

Abraham, Celeste M, Associate Professor. Periodontics. DDS, Howard University, 1988.


Acosta, Sandra T, Assistant Professor. Educational Psychology. PhD, Texas AM University, 2010.


Adams, Leslie G, Senior Professor. Veterinary Pathobiology. DVM, Texas AM University, 1968.


Adams, Ralph J, Distinguished Professor. History. PhD, University of California, Santa Barbara, 1972.


Agnolet, Glenn, Professor. Physics And Astronomy. PhD, Cornell University, 1983.

Agnor, Dottiedee, Instructional Associate Professor. Health Kinesiology. MS, Texas AM University, 1992.

Ahlgren, Angela K, Lecturer. Performance Studies. PhD, University of Texas, Austin, 2011.


Aitani, Koichiro, Associate Professor. Architecture. MAR, Virginia Polytechnic Institute and State University, 1997.


Akabani, Gamal, Associate Professor. Nuclear Engineering. PhD, Texas AM University, 1990.

Akbulut, Mustafa, Associate Professor. Chemical Engineering. PhD, University of California, Santa Barbara, 2007.


Akleman, Derya G, Senior Lecturer. Statistics. PhD, Texas AM University, 1996.


Alajlouni, Khalid, Clinical Professor. Restorative Sciences. DDS, Marquette University, 2011.


Alge, Daniel L, Assistant Professor. Biomedical Engineering. PhD, Purdue University, 2010.


Alkon, Cynthia J, Professor. School of Law. JD, University of California, 1990.


Allen, Angela J, Instructional Assistant Professor. Mathematics. MS, Texas AM University, 2005.


Allen, Natalie L, Senior Lecturer. Accounting. MS, Texas AM University, 1988.
Allen, Roland E, Professor. Physics And Astronomy. PhD, University of Texas, Austin, 1969.

Allred, Clinton D, Associate Professor. Nutrition Food Science. PhD, University of Illinois at Urbana-Champaign, 2002.


Alonzo, Juan J, Associate Professor. English. DSc, Washington University in St. Louis, 1991.

Alperntarlow, Sara, Associate Professor. History. PhD, University of Maryland, 1978.

Alton, Stephen R, Professor. School of Law. JD, University of Texas School of Law, 1981.


Alvard, Michael S, Associate Professor. Anthropology. PhD, University of New Mexico, 1993.


Ames, Aaron D, Associate Professor. Mechanical Engineering. PhD, University of California, Berkeley, 2006.

Amini, Noushin, Visiting Assistant Professor. Mechanical Engineering. PhD, Texas AM University, 2011.

An, Yonghong, Assistant Professor. Economics. PhD, John Hopkins University, 2011.

Anand, Nagamangala, Professor. Mechanical Engineering. PhD, Purdue University, 1983.

Anders, Katherine C, Assistant Professor. TAMU Libraries. MLIS, University of Pittsburgh, 2005.


Anderson, Richard K, Professor. Economics. PhD, Purdue University, 1976.

Anderson, Sammy K, Executive Associate Professor. Landscape Arch Urban Planning. PhD, Texas AM University, 1993.

Anderson, Stuart, Professor. Civil Engineering. PhD, University of Texas, 1989.


Annamalai, Kalyan, Professor. Mechanical Engineering. PhD, Georgia Institute of Technology, 1975.


Appiah, Bernard, Instructional Assistant Professor. School of Public Health. DrPH, Texas AM University, 2013.

Applegate, Brian E, Associate Professor. Biomedical Engineering. PhD, Ohio State University, 2000.


Archer, Gregory S, Assistant Professor Extension Specialist. Poultry Science. PhD, Texas AM University, 2005.

Archer, Holli R, Assistant Professor. Ag Leadership, Educ Comm. PhD, Texas AM University, 2013.

Arenas, Angela M, Assistant Professor. Veterinary Pathobiology. PhD, Texas AM University, 2007; DVM, La Salle University, Columbia, 2002.


Armstrong, Beth E, Lab Instructor. Biology. MS, Texas AM University, 2006.

Armstrong, Carisa L, Clinical Associate Professor. Health Kinesiology. MA, Case Western Reserve University, 2002.

Arnold, Carolyn E, Associate Professor. Vet Large Animal Clinical Sc. DVM, Michigan State University, 1998.


Arora, Rashi, Lecturer. Mathematics. MS, Texas AM University, 2011.

Arosh, Joe A, Associate Professor. Vet Integrative Biosciences. DVM, University Laval, 2004; PhD, Laval University, 2003.

Arosh, Sakhila Banu, Assistant Professor. Vet Integrative Biosciences. PhD, University of Madras, 2002.


Askew, Patricia J, Adjunct Professor. School of Law. JD, Texas Wesleyan University School of Law, 2005.


Aurispa, Benjamin, Instructional Assistant Professor. Mathematics. MS, Texas AM University, 2006.

Austin, Amy L, Instructional Assistant Professor. Mathematics. MS, Texas AM University, 1994.

Autenrieth, Robin L, Professor. Civil Engineering. PhD, Clarkson University, 1986.

Avnet, Mark S, Assistant Professor. Industrial Systems Eng. PhD, Massachusetts Institute of Technology, 2009.


Awika, Joseph M, Associate Professor. Soil Crop Sciences. PhD, Texas AM University, 2003.


Ayres, Pamela S, Professor. School of Law. JD, BAYLOR UNIVERSITY, 1988.

Aziz, Sahar F, Associate Professor. School of Law. JD, University of Texas School of Law, 2004.

Babe, John C, Assistant Professor Of The Practice. Architecture. PhD, University of Toronto, 1989.


Baetge, Courtney L, Clinical Assistant Professor. Vet Small Animal Clinical Sc. DVM, Texas AM University, 2003.

Bagavathiannan, Muthukumar V, Assistant Professor. Soil Crop Sciences. PhD, University of Manitoba, 2009.


Bailey, Gregory T, Clinical Assistant Professor. TAMU Libraries. MLIS, Indiana University, 2010.


Balbuena, Perla B, Professor. Chemical Engineering. PhD, University of Texas, 1996.


Baldwin, John T, Senior Lecturer. Chemical Engineering. PhD, Texas AM University, 1968.

Bales, Stephen E, Associate Professor. TAMU Libraries. PhD, University of Tennessee, 2008.


Ball, Judith M, Associate Professor. Veterinary Pathobiology. PhD, Louisiana State University, 1990.

Ballard, Danny J, Adjunct Professor. Health Kinesiology. PhD, Oklahoma State University, 1982.

Ballestro, John J, Clinical Associate Professor. TAMU Libraries. MS, University of Illinois at Urbana-Champaign, 2003.

Ballouli, Khalid W, Adjunct Assistant Professor. Health Kinesiology. PhD, Texas AM University, 2011.

Balog, Robert S, Associate Professor. Electrical Computer Eng. PhD, University of Illinois at Urbana-Champaign, 2006.


Baltazar, Juan Carlos, Tees Research Engineer. Architecture. PhD, Texas AM University, 2006.

Baltensperger, David D, Professor. Soil Crop Sciences. PhD, New Mexico State University, 1981.


Banta, Jason P, Associate Professor Extension Specialist. Animal Science. BS, Texas AM University, 1999.

Bardenhagen, Eric K, Assistant Professor. Landscape Arch Urban Planning. PhD, Texas AM University, 2011.


Barnes, Wayne R, Professor. School of Law. JD, Texas Tech University, 1995.

Barnhardt, Terrence M, Instructional Associate Professor. Psychology. PhD, University of Arizona, 1993.

Barondeau, David P, Associate Professor. Chemistry. PhD, Texas AM University, 1996.

Barr, Andrew, Assistant Professor. Economics. PhD, University of Virginia, 2015.


Barrett, Jeannie, Senior Lecturer. Accounting. MBA, Sam Houston State University, 2002.


Barrington, Jennifer J, Clinical Associate Professor. General Dentistry. DDS, University of Texas Health Science Center at Houston, 1996.


Barry, Adam, Associate Professor. Health Kinesiology. PhD, Texas AM University, 2007.

Bartlett, Leeanna, Assistant Professor. Public Health Sciences. BA, Texas AM University-Commerce, 1966.


Bastian, Peter A, Professor Of The Practice. Petroleum Engineering. MS, Texas AM University, 1983.


Batista, Paul J, Associate Professor. Health Kinesiology. JD, Baylor University, 1976.


Baumann, Paul A, Professor Extension Specialist. Soil Crop Sciences. PhD, Texas Tech University, 1981.

Baumgardner, David E, Senior Lecturer. Biology. PhD, Texas AM University, 2008.


Baxter, Jerry D, Executive Professor. Management. MBA, Georgia State University, 1996.


Bearfield, Domonic A, Associate Professor. Public Service Administration. PhD, Rutgers University, 2004.

Beason, William L, Associate Professor. Civil Engineering. PhD, Texas Tech University, 1980.

Beathard, Karen M, Senior Lecturer. Nutrition Food Science. MS, Texas Women's University, 1990.


Beaver, Bonnie V, Professor. Vet Small Animal Clinical Sc. DVM, University of Minnesota, 1968.


Bedford, Diane C, Clinical Assistant Professor. Health Kinesiology. MFA, Florida State University, 2010.


Bednarz, Sarah W, Professor. Geography. PhD, Texas AM University, 1992.


Beheshti, Ali, Visiting Assistant Professor. Mechanical Engineering. DEN, Louisiana State University, 2013.


Bellows, Charles T, Adjunct Professor. School of Law. JD, SMU Dedman School of Law, 1976.

Belmonte, Arthur P, Instructional Assistant Professor. Mathematics. MS, Texas AM University, 1986.


Benden, Mark E, Associate Professor. Environmental Occpnl Hlth. PhD, Texas AM University, 2006; MS, Texas AM University, 1992.


Benefiel, Candace, Associate Professor. TAMU Libraries. MS, University of Texas, 1981.


Beninger, Christine K, Associate Professor. Restorative Sciences. DDS, University of Southern California, 1978.


Bennett, George K, Senior Professor. Industrial Systems Eng. PhD, Texas Tech University, 1970.

Bennett, Gregg R, Professor. Health Kinesiology. EDD, Auburn University, 1997.


Benson, Monica A, Adjunct Professor. School of Law. JD, Texas Wesleyan University School of Law, 2002.

Bento, Pedro, Assistant Professor. Economics. PhD, University of Toronto, 2013.

Benz, Michael R, Professor. Educational Psychology. PhD, University of Oregon, 1983.


Bergbreiter, David E, Professor. Chemistry. PhD, Massachusetts Institute of Technology, 1974.


Bernard, Jessica A., Assistant Professor. Psychology. PhD, University of Michigan, 2012.


Berthot, Patricia A, Instructional Associate Professor. Health Kinesiology. MEd, Stephen F. Austin State University, 1990.

Bessler, David A, Professor. Agricultural Economics. PhD, University of California, Davis, 1977.


Birely, Anna C, Assistant Professor. Civil Engineering. PhD, University of Washington, 2012.


Bissett, Wesley T, Associate Professor. Vet Large Animal Clinical Sc. PhD, Texas AM University, 2007; DVM, Texas AM University, 1997.

Bitouni, Annetta, Assistant Professor. Public Health Sciences. DDS, National and Capodistrian University of Athens, 2004.


Blake, Jamilia J, Associate Professor. Educational Psychology. PhD, University of Georgia, 2007.

Blanchard, Terry L, Professor. Vet Large Animal Clinical Sc. DVM, Kansas State University, 1976; MS, University of Missouri-Columbia, 1983.

Blanton, Carlos K, Associate Professor. History. PhD, Rice University, 1999.


Bloomfield, Susan A, Professor. Health Kinesiology. EDD, Ohio State University, 1992.

Blue-Mclendon, Alice, Clinical Assistant Professor. Vet Physiology Pharmacology. DVM, Texas AM University, 1989.

Bluemel, Janet F, Professor. Chemistry. PhD, Technical University of Munich, Germany, 1989.

Boadu, Frederick O, Professor. Agricultural Economics. PhD, University of Kentucky, 1981.


Boellstorff, Diane E, Assistant Professor Extension Specialist. Soil Crop Sciences. PhD, University of California, 1991.


Boivie, Steven R, Associate Professor. Management. PhD, University of Texas, Austin, 2006.

Bokelmann, Annamarie D, Assistant Professor. Environmental Occptnl Hlth. MS, Texas AM University, 1999.


Bollinger, Kathryn L, Instructional Assistant Professor. Mathematics. MS, Texas AM University, 1998.

Bologan, Anatol, Professor. Restorative Sciences. DDS, University of Tennessee, 1976.


Booth, Geoffrey J, Associate Professor. Landscape Arch Urban Planning. MPA, University of Queensland, 1987; MS, University of Queensland, 1987.


Bosquez, Janet M, Instructional Assistant Professor. Health Kinesiology. MS, Texas AM University, 1986.


Boucher, Anthony M, Clinical Associate Professor. Health Kinesiology. PhD, Texas Women's University, 2008.

Boudreau, Christen E, Clinical Assistant Professor. Vet Small Animal Clinical Sc. DVM, Texas AM University, 2010; PhD, Baylor College of Medicine, 2001.


Bouton, Thomas W, Professor. Ecosystem Science Mgmt. PhD, Brigham Young University, 1979.

Bouwman, Christa, Associate Professor. Finance. PhD, University of Michigan, 2005.


Boyd, Dean L, Visiting Assistant Professor. Landscape Arch Urban Planning. PhD, Texas AM University, 1995.

Boyd, James G, Associate Professor. Aerospace Engineering. PhD, Texas AM University, 1994.


Brannan, Michael P, Assistant Professor. Mathematics. PhD, Queen's University, 2006.


Breken, Kirstin L, Instructional Professor. Health Kinesiology. MS, Texas AM University, 1982.

Brett, Jeremy W, Assistant Professor. TAMU Libraries. MLS, University of Maryland, 1999.

Brewer, Maurice A, Professor Of The Practice. Biomedical Engineering. PhD, Texas AM University, 1977.


Bridges, Cheryl H, Adjunct Professor. Marketing. BA, Texas Women's University, 1968.


Bright, Elise M, Professor. Landscape Arch Urban Planning. PhD, Texas AM University, 1980.

Bright, Leonard A, Associate Professor. Public Service Administration. PhD, Portland State University, 2003.


Brooks, Charles E, Associate Professor. History. PhD, University at Buffalo, State University of New York, 1988.


Brooks, Sarah D, Associate Professor. Atmospheric Sciences. PhD, University of Colorado, 2002.

Brossart, Dan F, Associate Professor. Educational Psychology. PhD, University of Missouri, 1996.


Brown, Lawrence S, Instructional Assistant Professor. Chemistry. PhD, Princeton University, 1983.


Brundage, Adrienne L, Assistant Lecturer. Entomology.
PhD, Texas AM University, 2012.

Bryan, Kisha C, Clinical Assistant Professor. Teaching, Learning Culture.
PhD, University of Florida, 2012.

Bryant, Henry L, Research Associate Professor. Agricultural Economics.
PhD, Texas AM University, 2003.

Bryant, John A, Associate Professor. Construction Science.
PhD, Texas AM University, 1995.

Bryant, Vaughn M, Professor. Anthropology.
PhD, University of Texas, Austin, 1969.

Bryk, Mary E, Associate Professor. Biochemistry And Biophysics.
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<th>Title</th>
<th>Department</th>
<th>Degree, Institution and Year</th>
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Washburn, Kevin E, Professor. Vet Large Animal Clinical Sc.
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Washburn, Shannon E, Clinical Assistant Professor. Vet Physiology Pharmacology.
PhD, Texas AM University, 2010; DVM, Texas AM University, 1994.

Watson, Karan L, Professor. Electrical Computer Eng.
PhD, Texas Tech University, 1982.

Watson, Nancy T, Clinical Associate Professor. Educ Admn Human Resource Dev.
PhD, Texas AM University, 1998.
Watson, Wesley T, Lecturer. Ecosystem Science Mgmt. PhD, Texas AM University, 1999.

Watt, John D, Clinical Associate Professor. Management. PhD, Kansas State University, 2002.


Waugh, Yuki, Instructional Assistant Professor. International Studies. PhD, University of Nebraska, 2006.


Waymer, Damion M, Associate Professor. Department Of Communication. PhD, Purdue University, 2006.

Weaver, Constance D, Professor. Accounting. PhD, Arizona State University, 1997.


Weeks, Bradley R, Professor. Veterinary Pathobiology. PhD, Kansas State University, 1988; DVM, Oklahoma State University, 1983; DVM, Oklahoma State University, 1983.


Welder, Gerrit, Visiting Assistant Professor. Mathematics. PhD, RWTH Aachen University, 2013.


Wen, Sy-Bor, Associate Professor. Mechanical Engineering. PhD, University of California, Berkeley, 2006.

Wenzel, Theresa M, Instructional Associate Professor. Health Kinesiology. MEd, Baylor University, 1992.

Werke, Carrie B, Lab Instructor. Chemistry. MS, Texas AM University, 2014.


Wesner, Kylene J, Lecturer. Department Of Communication. MA, Indiana University Purdue University, 2007.


West, Jason B, Associate Professor. Ecosystem Science Mgmt. PhD, University of Georgia, 2002.


West, William F, Professor. Public Service Administration. PhD, Rice University, 1981.


Wheeler, Steven E, Associate Professor. Chemistry. PhD, University of Georgia, 2006.

Wherley, Benjamin G, Assistant Professor. Soil Crop Sciences. PhD, North Carolina State University, 2008.

Whisenant, Steven G, Professor. Ecosystem Science Mgmt. PhD, Texas AM University, 1982.

Whitcomb, Della K, Senior Lecturer. Information Operations Mgmt. MS, Texas AM University, 1998.


White, James D, Senior Lecturer. Chemical Engineering. BA, Texas AM University, 1978.


Whiteacre, Matthew M, Senior Lecturer. Eng Tech Ind Distribution. MEN, Texas AM University, 1985.
Whitfield, Jennifer G, Instructional Assistant Professor. Mathematics. MS, Texas AM University, 2000.


Wickersham, Tryon A, Associate Professor. Animal Science. PhD, Kansas State University, 2006.

Wickliff, Tanya V D, Professor Of The Practice. College of Engineering. PhD, Texas AM University, 2005.


Wiederwohl, Christina L, Instructional Assistant Professor. Oceanography. PhD, Texas AM University, 2012.


Wilborn, David F, Associate Professor. Performance Studies. DMA, University of Texas, Austin, 1994.

Wilcox, Bradford P, Professor. Ecosystem Science Mgmt. PhD, Texas AM University, 1986.


Willard, Michael D, Professor. Vet Small Animal Clinical Sc. DVM, Texas AM University, 1975.

Willey, Harley M, Lecturer. Eng Tech Ind Distribution. MBA, Sam Houston State University, 1998; BS, Texas AM University, 1992.


Williams, Gary W, Professor. Agricultural Economics. PhD, Purdue University, 1981.


Wilson, Christin, Lecturer. Chemical Engineering. PhD, Ohio State University, 2012.

Wilson, Kelly L, Associate Professor. Health Kinesiology. PhD, Texas AM University, 2004.

Wilson, Lloyd T, Professor. Entomology. PhD, University of California, Davis, 1977.


Winking, Jeffrey W, Associate Professor. Anthropology. PhD, University of New Mexico, 2005.


Withers, Michael C, Assistant Professor. Management. PhD, Arizona State University, 2011.


Wolf, Joan B, Associate Professor. College of Liberal Arts. PhD, University of Chicago, 1997.

Wolfe, Christopher J, Professor. Accounting. DBA, Kent State University, 1984; PhD, Kent State University, 1984.

Wolken, Lawrence C, Senior Professor. Finance. PhD, Texas AM University, 1972.


Wolteming, Steven, Assistant Professor. Educational Psychology. PhD, University of Toronto, 2012.


Woo, Ayoung, Lecturer. Landscape Arch Urban Planning. PhD, Texas AM University, 2014.
Wood, Billy D, Professor. Political Science.
PhD, University of Houston, 1987.

Wood, Julia E, Assistant Professor. History.
PhD, Yale University, 2011.

Woodcock, David R, Adjunct Professor. School of Law.
JD, University of Texas School of Law, 2000.

Woodfin, Samuel H, Lecturer. Visualization.
BA, Art Center College of Design, 2011.

Woodman, Christopher R, Associate Professor. Health Kinesiology.
PhD, University of Arizona, The, 1995.

Woodman, Richard W, Professor. Management.
PhD, Purdue University, 1978.

Woodmansey, Karl F, Assistant Professor. Endodontics.
DDS, Baylor College of Dentistry, 1989.

Woods, Douglas W, Professor. Psychology.
PhD, Western Michigan University, 1999.

Woods, Timothy S, Instructional Associate Professor. Sociology.
PhD, Texas AM University, 2000.

Woodward, Richard T, Professor. Agricultural Economics.
PhD, University of Wisconsin, 1997.

Woodward, Robert S, Clinical Assistant Professor. Educational Psychology.
PhD, Texas AM University, 2004.

Woody, Ronald D, Professor. Restorative Sciences.
DDS, Marquette University, 1963.

Woolley, Karen L, Distinguished Professor. Chemistry.
PhD, Cornell University, 1993.

Woolley, James B, Professor. Entomology.
PhD, University of California, Riverside, 1983.

Woosley, James R, Instructional Professor. Health Kinesiology.
MS, Western Illinois University, 1974.

Woosnam, Kyle M, Associate Professor. Recreation, Park Tourism Sc.
PhD, Clemson University, 2008.

Workman, Ronald L, Senior Lecturer. Construction Science.
MS, Texas AM University, 2002.

Worthy, Darrell A, Associate Professor. Psychology.
PhD, University of Texas, 2010.

Wortman, Martin A, Professor. Industrial Systems Eng.
PhD, Virginia Polytechnic Institute and State University, 1988.

Wright, David L, Professor. Health Kinesiology.
PhD, Pennsylvania State University, 1989.

Wright, John M, Professor. Diagnostic Sciences.
DDS, West Virginia University, 1973.

Wright, Kimberly B, Assistant Lecturer. Teaching, Learning Culture.
MS, Texas AM University, 2008.

Wright, Lori E, Professor. Anthropology.
PhD, University of Chicago, 1994.

Wright, Rachel N, Lab Instructor. Biology.
PhD, Texas AM University, 2011.

Wright, Scott, Instructional Assistant Professor. Health Kinesiology.
MA, University of Texas, Pan American, 1997.

Wright, Steven M, Professor. Electrical Computer Eng.
PhD, University of Illinois, 1984.

Wu, Chaodong, Associate Professor. Nutrition Food Science.
PhD, Beijing Medical University, 1998.

Wu, Guoyao, Distinguished Professor. Animal Science.
PhD, University of Alberta, 1989.

Wu, Hung-Jen, Assistant Professor. Chemical Engineering.
PhD, Texas AM University, 2006.

Wu, Kan, Assistant Professor. Petroleum Engineering.
PhD, University of Texas, Austin, 2014.

Wu, Wei, Assistant Professor. Finance.
PhD, University of Chicago, 2015.

Wu, Wenhan, Associate Professor. Physics And Astronomy.
PhD, University of Chicago, 1992.

Wu, Ximing, Professor. Agricultural Economics.
PhD, University of California, Berkeley, 2003.

Wu, Xinyuan B, Professor. Ecosystem Science Mgmt.
PhD, University of Tennessee, 1991.

Wu, Yuan, Assistant Lecturer. Performance Studies.
PhD, University of Illinois at Urbana-Champaign, 2013.

Wunneburger, Douglas F, Senior Lecturer. Landscape Arch Urban Planning.
PhD, Texas AM University, 1992.

Wurbs, Ralph A, Professor. Civil Engineering.
PhD, Colorado State University, 1978.

Wyatt, Leigh A, Assistant Professor. Dental Hygiene.
MA, Dallas Theological Seminary, 2009.

Wylie, Wayne E, Associate Professor. Health Kinesiology.
PhD, University of Tennessee, 1981.

Xiang, Ping, Professor. Health Kinesiology.
PhD, Louisiana State University, 1996.

Xiao, Yi, Associate Professor. TAMU Libraries.
MLIS, Emporia State University, 1993.

Xiao, Yu, Associate Professor. Landscape Arch Urban Planning.
PhD, University of Illinois at Urbana-Champaign, 2008.

Xie, Le, Associate Professor. Electrical Computer Eng.

Xie, Zhizhang, Assistant Professor. Mathematics.
PhD, Ohio State University, 2011.


Xu, Keli, Professor. Economics. PhD, Yale University, 2007.

Xu, Yi, Associate Professor. Institute of Biosciences Tec. PhD, University of Texas Health Science Center at Houston, 1988.


Yakovlev, Vladislav V, Professor. Biomedical Engineering. PhD, Moscow State University, 1990.

Yalvac, Bugrahan, Associate Professor. Teaching, Learning Culture. PhD, Pennsylvania State University, 2005.

Yamauchi, Takashi, Associate Professor. Psychology. PhD, Columbia University, 1997.


Yan, Wei, Associate Professor. Architecture. PhD, University of California, Berkeley, 2005.


Yang, Ping, Professor. Atmospheric Sciences. PhD, University of Utah, 1995.


Yarak, Larry W, Associate Professor. History. PhD, Northwestern University, 1983.


Yates, Justin T, Assistant Professor. Industrial Systems Eng. PhD, University at Buffalo, State University of New York, 2008.


Yeh, Alvin T, Associate Professor. Biomedical Engineering. PhD, University of California, Berkeley, 2000.


Yeoman, Michelle S, Lecturer. Vet Integrative Biosciences. MS, Texas AM University, 2013.

Ying, Qi, Associate Professor. Civil Engineering. PhD, University of California, Davis, 2004.

Yoon, Myeongsun, Associate Professor. Educational Psychology. PhD, Arizona State University, 2007.

Young, James L, Adjunct Professor. School of Law. JD, University of Houston, 1985.


Young, Ryland F, Professor. Biochemistry And Biophysics. PhD, University of Texas, Dallas, 1975.

Youngblood, Dave H, Professor. Physics And Astronomy. PhD, Rice University, 1965.

Yu, Choongho, Associate Professor. Mechanical Engineering. PhD, University of Texas, Austin, 2004.


Yu, Peng, Assistant Professor. Electrical Computer Eng. PhD, University of Texas, 2009.

Yu, Wangjie, Research Assistant Professor. Biology. PhD, Saitama Medical School, 2002.

Yuan, Shuhua, Associate Professor. Plant Pathology Microbiology. PhD, University of Tennessee, 2007.

Yue, Xiaohui, Instructional Assistant Professor. Educational Psychology. PhD, Virginia Polytechnic Institute and State University, 2011.

Yust, Christopher, Assistant Professor. Accounting. PhD, University of Texas, Austin, 2015.


Zeng, Lanying, Assistant Professor. Biochemistry And Biophysics. PhD, University of Illinois at Urbana-Champaign, 2007.


Zhan, Hongbin, Professor. Geology Geophysics. PhD, University of Nevada, Reno, 1996.

Zhan, Wei, Associate Professor. Eng Tech Ind Distribution. PhD, Northwestern University, 1991.

Zhang, Dan D, Professor. Educational Psychology. DVM, University of New Orleans, 1998; PhD, University of New Orleans, The, 1998.
Zhang, Dekai, Associate Professor. Institute of Biosciences Tec. PhD, University of Hong Kong, 1998.

Zhang, Hongbin, Professor. Soil Crop Sciences. PhD, University of California, Davis, 1990.

Zhang, Junjie, Assistant Professor. Biochemistry And Biophysics. PhD, Baylor College of Medicine, Houston, TX, 2009.


Zhang, Yu, Assistant Professor. Agricultural Economics. PhD, Texas AM University, 2010.

Zhang, Yunlong, Associate Professor. Civil Engineering. PhD, Virginia Tech, 1996.

Zhang, Yuzhe, Associate Professor. Economics. PhD, University of Minnesota, 2006.


Zhao, Hongwei, Professor. Epidemiology Biostatistics. DSc, Harvard University, 1997; PhD, Harvard, 1997.


Zheng, Qi, Associate Professor. Epidemiology Biostatistics. PhD, Texas AM University, 1993.


Zhou, Yubin, Assistant Professor. Institute of Biosciences Tec. PhD, Georgia State University, 2008.

Zhu Salzman, Keyan, Professor. Entomology. PhD, Purdue University, 1994.


Zhu, Guan, Professor. Veterinary Pathobiology. PhD, University of Georgia, 1993.

Zhu, Xuemei, Associate Professor. Architecture. PhD, Texas AM University, 2008.

Zimmer, Mary R, Clinical Associate Professor. Marketing. PhD, University of Texas, 1985.

Zimmermann, Mark J, Adjunct Professor. School of Law. JD, University of Virginia, 1975.


Zollinger, Dan, Professor. Civil Engineering. PhD, University of Illinois at Urbana-Champaign, 1989.

Zoran, Debra L, Professor. Vet Small Animal Clinical Sc. PhD, Texas AM University, 1997; DVM, Kansas State University, 1984.


Zuniga, Genny C, Associate Professor. Environmental Occpnal Hlth. PhD, Tulane University, 1993.


Appendices

- Rules and Regulations for Determining Residence Status (p. 1094)
- Texas Common Course Numbering System (p. 1094)
- Family Educational Rights and Privacy Act (p. 1098)
- International Agreements (p. 1099)
- Scholastic Honor Societies (p. 1102)
- Oak Ridge Associated Universities (p. 1103)
- Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act (Clery Act) (p. 1103)
- Education Code - Hazing (p. 1104)

**Rules and Regulations for Determining Residence Status**

**Determination of Residency for Tuition Purposes**

In accordance with Texas Higher Education Coordinating Board Rules and pursuant to Texas Education Code, a student's status as a resident, nonresident or international (foreign) student for tuition purposes will be determined in the Office of Admissions prior to enrollment. Students must be prepared to pay tuition and other required fees by specified due dates.

Students with a status of permanent resident of the United States are not automatically eligible as a Texas state resident for tuition purposes.

Students who have knowledge of an error in their residency status for tuition purposes are responsible for notifying the Office of the Registrar and may be required to submit the Core Residency Questions form, which is available for download on the Office of the Registrar (http://registrar.tamu.edu) website in order to amend their status.

Questions should be directed to the Residency Officer at (979) 845-8606 or email residency@tamu.edu. Complete rules and regulations are available on the Texas Higher Education Coordinating Board website.

**Texas A&M and Texas Common Course Equivalents**

<table>
<thead>
<tr>
<th>Texas A&amp;M Course</th>
<th>TCCNS Equivalent Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT 229 Introductory Accounting</td>
<td>ACCT 2301</td>
</tr>
<tr>
<td>ACCT 229 Introductory Accounting</td>
<td>ACCT 2401</td>
</tr>
<tr>
<td>ACCT 230 Introductory Accounting</td>
<td>ACCT 2302</td>
</tr>
<tr>
<td>ACCT 230 Introductory Accounting</td>
<td>ACCT 2402</td>
</tr>
<tr>
<td>AGEC 105 Introduction to Agricultural Economics</td>
<td>AGRI 2317</td>
</tr>
<tr>
<td>AGLS 101 Modern Agricultural Systems and Renewable Natural Resources</td>
<td>AGRI 1131</td>
</tr>
<tr>
<td>AGLS 101 Modern Agricultural Systems and Renewable Natural Resources</td>
<td>AGRI 1231</td>
</tr>
<tr>
<td>AGSM 201 Agricultural Energy and Power Systems</td>
<td>AGRI 2301</td>
</tr>
<tr>
<td>ANSC 107 General Animal Science</td>
<td>AGRI 1319</td>
</tr>
<tr>
<td>ANSC 107 and ANSC 108 General Animal Science</td>
<td>AGRI 1419</td>
</tr>
<tr>
<td>ANTH 201 Introduction to Anthropology</td>
<td>ANTH 2346</td>
</tr>
<tr>
<td>ANTH 201 Introduction to Anthropology</td>
<td>HUMA 2323</td>
</tr>
<tr>
<td>ANTH 202 Introduction to Archaeology</td>
<td>ANTH 2302</td>
</tr>
<tr>
<td>ANTH 210 Social and Cultural Anthropology</td>
<td>ANTH 2351</td>
</tr>
<tr>
<td>ARAB 101 Beginning Arabic I</td>
<td>ARAB 1411</td>
</tr>
<tr>
<td>ARAB 101 Beginning Arabic I</td>
<td>ARAB 1511</td>
</tr>
<tr>
<td>ARAB 102 Beginning Arabic II</td>
<td>ARAB 1412</td>
</tr>
<tr>
<td>ARAB 102 Beginning Arabic II</td>
<td>ARAB 1512</td>
</tr>
<tr>
<td>ARAB 201 Intermediate Arabic I</td>
<td>ARAB 2311</td>
</tr>
<tr>
<td>ARAB 202 Intermediate Arabic II</td>
<td>ARAB 2312</td>
</tr>
<tr>
<td>ARCH 249 Survey of World Architecture History I</td>
<td>ARCH 1301</td>
</tr>
<tr>
<td>ARCH 250 Survey of World Architecture History II</td>
<td>ARCH 1302</td>
</tr>
<tr>
<td>ARTS 103 Design I</td>
<td>ARTS 1311</td>
</tr>
<tr>
<td>ARTS 111 Drawing I</td>
<td>ARTS 1316</td>
</tr>
<tr>
<td>ARTS 149 Art History Survey I</td>
<td>ARTS 1303</td>
</tr>
<tr>
<td>ARTS 150 Art History Survey II</td>
<td>ARTS 1304</td>
</tr>
<tr>
<td>ASTR 101 Basic Astronomy</td>
<td>ASTR 1303</td>
</tr>
<tr>
<td>ASTR 111 Overview of Modern Astronomy</td>
<td>ASTR 1303 and ASTR 1103</td>
</tr>
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<td>PHYS 1303 and PHYS 1103</td>
</tr>
<tr>
<td>ASTR 111 Overview of Modern Astronomy</td>
<td>ASTR 1403</td>
</tr>
</tbody>
</table>

The current version of this document may be found on the Office of Admissions (http://admissions.tamu.edu) website.

**Texas Common Course Numbering System**

The Texas Common Course Numbering System (TCCNS) has been designed for the purpose of aiding students in the transfer of general academic courses between colleges and universities throughout Texas. Common courses are freshman and sophomore academic credit courses that have been identified as common by institutions that are members of the common course numbering system. The system ensures that if the student takes the courses the receiving institution designates as common, then the courses will be accepted in transfer and the credit will be treated as if the courses had actually been taken on the receiving institution’s campus.

The table below lists the courses Texas A&M University has identified as common and their TCCNS equivalents. Before using this table students should be sure that the institution they attend employs the TCCNS.

This table is revised quarterly in January, March, June and September. The most recent version may be obtained from the Office of Admissions.
<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
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<td>Overview of Modern Astronomy</td>
</tr>
<tr>
<td>BIOL 101</td>
<td>Botany</td>
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<tr>
<td>BIOL 107</td>
<td>Zoology</td>
</tr>
<tr>
<td>BIOL 111</td>
<td>Introductory Biology I</td>
</tr>
<tr>
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<td>Introductory Biology II</td>
</tr>
<tr>
<td>BIOL 206</td>
<td>Introductory Microbiology</td>
</tr>
<tr>
<td>CHEM 101</td>
<td>Fundamentals of Chemistry I</td>
</tr>
<tr>
<td>CHEM 102</td>
<td>Fundamentals of Chemistry II</td>
</tr>
<tr>
<td>CHEM 106</td>
<td>Molecular Science for Citizens</td>
</tr>
<tr>
<td>CHEM 111</td>
<td>Fundamentals of Chemistry Laboratory I</td>
</tr>
<tr>
<td>CHEM 112</td>
<td>Fundamentals of Chemistry II and Fundamentals of Chemistry Laboratory II</td>
</tr>
<tr>
<td>CHEM 116</td>
<td>Molecular Science for Citizens and Molecular Science for Citizens Laboratory</td>
</tr>
<tr>
<td>CHEM 227</td>
<td>Organic Chemistry I</td>
</tr>
<tr>
<td>CHEM 228</td>
<td>Organic Chemistry II</td>
</tr>
<tr>
<td>CHEM 237</td>
<td>Organic Chemistry Laboratory</td>
</tr>
<tr>
<td>CHEM 238</td>
<td>Organic Chemistry Laboratory</td>
</tr>
<tr>
<td>CHIN 101</td>
<td>Beginning Chinese I</td>
</tr>
<tr>
<td>CHIN 102</td>
<td>Beginning Chinese II</td>
</tr>
<tr>
<td>CHIN 201</td>
<td>Intermediate Chinese I</td>
</tr>
<tr>
<td>CHIN 202</td>
<td>Intermediate Chinese II</td>
</tr>
<tr>
<td>CLAS 101</td>
<td>Beginning Classical Greek I</td>
</tr>
<tr>
<td>CLAS 102</td>
<td>Beginning Classical Greek II</td>
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<tr>
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<td>Beginning Latin I</td>
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</tr>
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<td>CLAS 211</td>
<td>Intermediate Greek</td>
</tr>
<tr>
<td>CLAS 221</td>
<td>Intermediate Latin I</td>
</tr>
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<td>Intermediate Latin II</td>
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<td>COMM 101</td>
<td>Introduction to Communication</td>
</tr>
<tr>
<td>COMM 203</td>
<td>Public Speaking</td>
</tr>
<tr>
<td>COMM 210</td>
<td>Group Communication and Discussion</td>
</tr>
<tr>
<td>COMM 215</td>
<td>Interviewing: Principles and Practice</td>
</tr>
<tr>
<td>COMM 243</td>
<td>Argumentation and Debate</td>
</tr>
<tr>
<td>COSC 253</td>
<td>Construction Materials and Methods I</td>
</tr>
<tr>
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<td>Construction Materials and Methods II</td>
</tr>
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<td>CSCE 206</td>
<td>Structured Programming in C</td>
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<td>Dairying</td>
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<td>DCED 160</td>
<td>Ballet I</td>
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<td>Ballet II</td>
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<td>Ballet III</td>
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<td>Modern Dance I</td>
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<td>Design Communication Foundations</td>
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<td>ARCH 1404</td>
<td></td>
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<td></td>
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<td>Course Title</td>
</tr>
<tr>
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<td>------------------------------------------------------------</td>
</tr>
<tr>
<td>ENDS 115</td>
<td>Design Communication Foundations</td>
</tr>
<tr>
<td>ENDS 116</td>
<td>Design Communication Foundations II</td>
</tr>
<tr>
<td>ENDS 116</td>
<td>Design Communication Foundations II</td>
</tr>
<tr>
<td>ENDS 116</td>
<td>Design Communication Foundations II</td>
</tr>
<tr>
<td>ENGL 103</td>
<td>Introduction to Rhetoric and Composition</td>
</tr>
<tr>
<td>ENGL 104</td>
<td>Composition and Rhetoric</td>
</tr>
<tr>
<td>ENGL 210</td>
<td>Technical and Business Writing</td>
</tr>
<tr>
<td>ENGL 221</td>
<td>World Literature</td>
</tr>
<tr>
<td>ENGL 222</td>
<td>World Literature</td>
</tr>
<tr>
<td>ENGL 227</td>
<td>American Literature: The Beginnings to Civil War</td>
</tr>
<tr>
<td>ENGL 228</td>
<td>American Literature: Civil War to Present</td>
</tr>
<tr>
<td>ENGL 231</td>
<td>Survey of English Literature I</td>
</tr>
<tr>
<td>ENGL 232</td>
<td>Survey of English Literature II</td>
</tr>
<tr>
<td>ENGL 235</td>
<td>Elements of Creative Writing</td>
</tr>
<tr>
<td>ESSM 203</td>
<td>Forest Trees of North America</td>
</tr>
<tr>
<td>FINC 201</td>
<td>Personal Finance</td>
</tr>
<tr>
<td>FINC 201</td>
<td>Personal Finance</td>
</tr>
<tr>
<td>FIVS 205</td>
<td>Introduction to Forensic and Investigative Sciences</td>
</tr>
<tr>
<td>FREN 101</td>
<td>Beginning French I</td>
</tr>
<tr>
<td>FREN 102</td>
<td>Beginning French II</td>
</tr>
<tr>
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<td>Beginning French II</td>
</tr>
<tr>
<td>FREN 201</td>
<td>Intermediate French I</td>
</tr>
<tr>
<td>FREN 202</td>
<td>Intermediate French II</td>
</tr>
<tr>
<td>FSTC 201</td>
<td>Food Science</td>
</tr>
<tr>
<td>GEOG 201</td>
<td>Introduction to Human Geography</td>
</tr>
<tr>
<td>GEOG 202</td>
<td>Geography of the Global Village</td>
</tr>
<tr>
<td>GEOG 203</td>
<td>Planet Earth</td>
</tr>
<tr>
<td>GEO 101</td>
<td>Principles of Geology</td>
</tr>
<tr>
<td>GEO 101</td>
<td>Principles of Geology</td>
</tr>
<tr>
<td>GEO 106</td>
<td>Historical Geology</td>
</tr>
<tr>
<td>GEO 106</td>
<td>Historical Geology</td>
</tr>
<tr>
<td>GERM 101</td>
<td>Beginning German I</td>
</tr>
<tr>
<td>GERM 101</td>
<td>Beginning German I</td>
</tr>
<tr>
<td>GERM 102</td>
<td>Beginning German I</td>
</tr>
<tr>
<td>GERM 102</td>
<td>Beginning German I</td>
</tr>
<tr>
<td>GERM 201</td>
<td>Intermediate German I</td>
</tr>
<tr>
<td>GERM 202</td>
<td>Intermediate German I</td>
</tr>
</tbody>
</table>
KINE 213 Foundations of Kinesiology
KINE 214/HLTH 214 Health and Physical Activity for Children
KINE 215 Fundamentals of Coaching
KINE 215 Fundamentals of Coaching
MATH 102 Algebra
MATH 102 Algebra
MATH 142 Business Mathematics II
MATH 150 Functions, Trigonometry and Linear Systems
MATH 151 Engineering Mathematics I
MATH 151 Engineering Mathematics I
MATH 152 Engineering Mathematics II
MATH 251 Engineering Mathematics III
MATH 251 Engineering Mathematics III
MATH 253 Engineering Mathematics III
MGMT 105 Introduction to Business
MGMT 212 Business Law
MUSC 102 Fundamentals of Music
MUSC 102 Fundamentals of Music
MUSC 102 Fundamentals of Music
MUSC 102 Fundamentals of Music
MUSC 201 Music and the Human Experience
MUSC 204 Music Theory I
MUSC 205 Music Theory II
MUSC 206 Music Theory III
MUSC 206 Music Theory III
MUSC 206 Music Theory III
MUSC 208 Music Theory III
MUSC 208 Music Theory III
MUSC 210 Music theory II
MUSC 210 Music Theory II
MUSC 245 Composition I
MUSC 245 Composition I
MUSC 253 Individual Performance: Guitar I
MUSC 254 Individual Performance—MUSI 1183
MUSC 254 Individual Performance—MUSI 1184
MUSC 254 Individual Performance—MUSI 2183
MUSC 254 Individual Performance—MUSI 2184
MUSC 255 Individual Performance—MUSI 1114
MUSC 255 Individual Performance—MUSI 1115
MUSC 255 Individual Performance—MUSI 1118
MUSC 255 Individual Performance—MUSI 1119
MUSC 255 Individual Performance—MUSI 2115
MUSC 255 Individual Performance—MUSI 2181
MUSC 255 Individual Performance—MUSI 2182
MUSC 256 Individual Performance: String I
MUSC 270 Individual Performance: Woodwind I
MUSC 271 Individual Performance: Brass I
MUSC 272 Individual Performance: Percussion I
NUTR 202 Fundamentals of Human Nutrition
NUTR 202 Fundamentals of Human Nutrition
OCNG 251 Oceanography
OCNG 251 Oceanography
OCNG 252 Oceanography and Oceanography Laboratory
OCNG 251 and OCNG 252 Oceanography and Oceanography Laboratory
PHIL 111 Contemporary Moral Issues
PHIL 240 Introduction to Logic
PHIL 241 Introduction to Philosophy
PHYS 201 College Physics
PHYS 201 College Physics
PHYS 202 College Physics
PHYS 202 College Physics
PHYS 208 Electricity and Optics
PHYS 208 Electricity and Optics
PHYS 208 Electricity and Optics
PHYS 218 Mechanics
PHYS 218 Mechanics
POLS 206 American National Government
POLS 207 State and Local Government
PORT 101 Beginning Portuguese I
PORT 101 Beginning Portuguese I
PORT 102 Beginning Portuguese II
PORT 102 Beginning Portuguese II
PORT 201 Intermediate Portuguese I
Family Educational Rights and Privacy Act

Texas A&M University informs students annually of the Family Educational Rights and Privacy Act. This Act, with which the University intends to comply fully, is intended to protect the privacy of education records, to establish the rights of students to inspect and review their education records and to provide guidelines for the correction of inaccurate or misleading data through informal and formal hearings. Students also have the right to file complaints with the Family Policy Compliance Office of the Department of Education in Washington, D.C. concerning alleged failures by the University to comply with the Act.

The Family Educational Rights and Privacy Act (FERPA) is a federal regulation that provides minimum standards for the management of student education records for universities receiving funds made available under any federal program administered by the U.S. Commissioner of Education. The Act provides, among other things, that an institution will maintain the confidentiality of student education records, and students will have the right to inspect their own education records.

This Policy is designed to meet FERPA provisions. Texas A&M University is committed to the good faith implementation of this Policy. Questions may be emailed to ferpa@tamu.edu.

If a student, the parent of a student, or any other individual has a complaint that an official of the University is violating FERPA, and the complaint cannot be satisfactorily resolved within the University, that person has the right to file a complaint with the Department of Education by contacting:

Family Policy Compliance Office
U.S. Department of Education
400 Maryland Ave., S.W.
Washington, D.C. 20202-5920

For the purposes of this Policy, Texas A&M University has used the following definitions of terms:

**Student.** Person who attends or has attended a program of instruction sponsored by Texas A&M University.

**Education Records.** Any records (in handwriting, print, tapes, film or other medium) maintained by the University, an employee of the University or agent of the University which is related to the student.

**Directory Information.** The following directory information may be made public unless the student desires to withhold any or all of this information: the student’s name, UIN (Universal Identification Number), local address, permanent address, email address, local telephone number, permanent telephone number, dates of attendance, program of study, classification, previous institution(s) attended, degrees received, honors and awards received, participation in officially recognized activities and sports, medical residence location (Health Science Center students), and medical residence specialization (Health Science Center students).

Currently enrolled students wishing to withhold any or all directory information items may do so by going to the My Record tab in the Howdy (https://howdy.tamu.edu) portal, clicking on “Withhold Directory Information.”

1. Must include a lab.
2. KINE 199 Ballet III is equivalent to DANC 2141.
3. KINE 199 Jazz Dance I is equivalent to DANC 1147.
4. KINE 199 Jazz Dance III is equivalent to DANC 2147.
5. KINE 199 Modern Dance III is equivalent to DANC 2145.
Information* in the My Information channel and submitting a completed form.

Directory information may be released unless a Withhold Directory Information request is submitted by the student. The request remains in effect until the student revokes it or is deceased. Only currently enrolled students may request directory information be withheld.

**Statement of Rights**

Texas A&M University encourages students to exercise all of their rights under the Family Educational Rights and Privacy Act. Operating under the premise that the educational process is a cooperative venture between a student and the University, we emphasize the following rights of eligible students:

1. the right to inspect and review, with certain limited exceptions, the student’s educational records, including the right to receive explanations and interpretations of the records and to obtain copies of the records when such are needed to allow the student to effectively exercise his/her right of inspection and review;
2. the right to consent to disclosures of personally identifiable information contained in the student’s education records, except to the extent that FERPA authorizes disclosure without consent.

One exception which permits disclosure without consent is disclosure to school officials with legitimate educational interests. A school official is a person or entity: (a) employed by the university or the university system in an administrative, supervisory, academic or research, or support staff position; (b) serving on a university governing body or duly authorized panel or committee; or (c) employed by or under contract to the university to perform a special task, function, or service for the university.

A school official has a legitimate educational interest if the information requested is necessary for that official to (a) perform appropriate tasks that are specified in his/her position description or in the performance of regularly assigned duties by a lawful supervisor; (b) fulfill the terms of a contractual agreement; (c) perform a task related to a student’s education; (d) perform a task related to the discipline of a student; or (e) provide a service or benefit relating to the student or student’s family, such as health care, counseling, financial aid, job placement, or former student-related activities.

Disclosure to a school official having a legitimate educational interest does not constitute university authorization to transmit, share, or disclose any or all information received to third parties unless such disclosure is permitted or required by law.

3. the right to correct a student’s education records when the records are inaccurate, misleading or otherwise in violation of FERPA;
4. the right to report violations of FERPA to the Department of Education;
5. the right to be informed about FERPA rights.

All the rights and protections given students under FERPA belong to the student. However, information in student records may be provided to parents/legal guardians without the written consent of the student if the eligible student is a financial dependent of his or her parents/legal guardians as defined under Section 152 of the Internal Revenue Code of 1954.

**Records Not Available for Information and Review**

Students shall have access to all education records concerning them maintained by the University with the exception of the following:

1. A personal record kept by a university faculty or staff member which meets the following tests:
   a. It is in the personal possession of the individual who made it.
   b. Information contained in it has never been revealed or made available to any other person except the maker’s temporary substitute.
2. An employment record which is used in relation to a student’s employment by the University, except where an individual in attendance at the University is employed as a result of his or her status as a student.
3. Records relating to a student which are created or maintained by a physician, psychiatrist, psychologist or other recognized professional or para-professional acting in his or her professional or para-professional capacity or assisting in that capacity which are used in connection with the provision of treatment to a student and are not disclosed to anyone other than the individuals providing the treatment.
4. Financial records and statements of a student’s parents.
5. Confidential letters and statements of recommendation which were placed in the education records of a student prior to January 1, 1975.
6. Confidential letters and statements of recommendation which were placed in the education records of a student on or after January 1, 1975, if the student has waived his or her right to inspect and review the letters or statements.
7. Records concerning admissions to an academic component of the University which the student has never attended.

Any questions concerning FERPA should be directed to the Office of the Registrar.

**International Agreements**

In order to help internationalize the campus and create significant global opportunities for our students and faculty, Texas A&M University has active, formal agreements with foreign institutions as well as Reciprocal Educational Exchange Programs (REEP). For information regarding international Partnerships visit the Global Program Support (http://globalsupport.tamu.edu) website or call Public Partnership & Outreach, Global Partnerships office at 979.845.3099.

All current (as of April 2015) agreements with foreign institutions are as follows:

**Argentina**

Universidad del Salvador¹ (2014)

**Armenia**

Armenian State Agrarian University (2012)

**Australia**

Queensland University of Technology¹ (2001)

University of Adelaide¹ (2010)
Appendices

University of Queensland\(^1\) (2012)
University of New South Wales\(^1\) (2014)
Australian Defence Academy

**Austria**

Johannes Kepler Universität - Linz\(^1\) (1986)
Wirtschaftsuniversität Wien\(^1\) (2008)
Vienna University of Economics and Business

**Brazil**

CAPES - Brazilian Federal Agency for Support and Evaluation of Graduate Education (2012)
Pontifícia Universidade Católica do Rio de Janeiro\(^1\) (2013)
Produttore Consutores Associados (2014)
Universidade de São Paulo\(^1\) (2012)
Universidade de São Paulo en Sao Carlos\(^1\) (2014)
Universidade Estadual Paulista (1989)
Universidade de Pernambuco\(^1\) (2014)
Universidade Federal de Pernambuco\(^1\) (2012)
Universidade Federal do Rio de Janeiro (UFRJ)\(^1\) (2011)
Universidade Federal do Rio Grande Do Norte\(^1\) (2002)
Universidade Federal Rural de Pernambuco\(^1\) (2012)

**Canada**

Carleton University\(^1\) (2012)

**Chile**

Pontificia Universidad Católica de Chile (2011)

**China**

Beihang University (2014)
Beijing Jiaotong University\(^1\) (2009)
Dalian University of Technology (1988)
Fujian Agriculture & Forestry University (2012)
Harbin Engineering University (2006)
Harbin Institute of Technology (2014)
Nanjing Medical College (1988)
Nanjing University of Science and Technology (2013)
Ocean University of China (2006)

Peking University\(^1\) (1992)
Shanghai Institute for International Studies\(^1\) (2012)
Southwestern University of Finance and Economics\(^1\) (2011)
Tianjin University (1995)
Tongji University (2014)
Tsinghua University\(^1\) (2004)
University of Electronic and Science and Technology of China (2014)
University of Nottingham, Ningbo\(^1\) (2014)
Wuhan University (2014)

**Colombia**

Universidad Del Magdalena (2011)
Universidad Industrial de Santander (1987)

**Cyprus**

University of Cyprus (2014)

**Denmark**

Copenhagen Business School\(^1\) (2014)

**Ecuador**

Escuela Superior Politécnica del Litoral (ESPOL) (2005)
Universidad San Francisco de Quito\(^1\) (2004)
University of Cuenca (2015)

**Egypt**

British University of Egypt (2010)

**France**

Centre International de Formation Europeenne (2011)
École le de Management Strasbourg\(^1\) (1999)
École Superiéure d’Ingénieurs de Luminy\(^1\) (2010)
EDHEC Business School\(^1\) (2003)
EMLYON Business School (École De Management De Lyon)\(^1\) (2003)
Federation Des École Superiéures d’ingenieurs en Agriculture (FESIA)\(^1\) (1998)
Institut National Polytechnique Toulouse (2013)
Institut Supérieur d’Electronique de Paris (2010)
Université de Caen\(^1\) (2004)

**Germany**
 Clausthal University of Technology (2008)
 Eberhard Karls Universität Tübingen¹ (2012)
 European Business School Universität¹ (2008)
 German Consortium (Freie, Humboldt & Potsdam)¹ (2011)
 Helmut Schmidt Universität¹ (2012)
 Munich Business School (2012)
 Ruhr Universität (2004)
 Universität Hohenheim¹ (2011)
 University of Applied Sciences¹ (2005)
 WHU Otto Beisheim School of Management - Koblenz¹ (2003)

 Greece
 American Farm School (2012)
 Aristotle University of Thessaloniki (2011)
 University of Ioannina (2014)
 University of Thessaly¹ (2005)

 Hong Kong
 Hong Kong University of Science and Technology¹ (2001)

 India
 Indian Institute of Management Bangalore (IIMB)¹ (2014)
 Indian Institute of Technology Hyderabad (2014)
 Indian Institute of Technology Kanpur (2013)
 Jindal School of International Affairs¹ (2012)
 Pandit Deendayal Petroleum University (2013)
 Rajiv Gandhi Institute for Petroleum Technology (2013)
 SDM Institute for Management Development¹ (2008)
 University Gadjah Mada (2014)
 University of Agricultural Sciences – Dharwad (2003)
 University of Horticultural Sciences (2010)

 Indonesia
 Institut Teknologi Bandung (2014)
 University Gadjah Mada (2014)

 Ireland
 University College Dublin, National University of Ireland¹ (2012)

 Italy
 Politecnico di Torino (2014)
 Scuola Internazionale Superiore di Studi Avanzati (SISSA) (2011)
 Università Degli Studi Di Foggia¹ (2005)
 Università Commerciale 'Luigi Bocconi' di Milano¹ (2014)
 Università of Rome, La Sapienca¹ (1988)
 Università of Rome, Tor Vergata (2005)
 University of Padova¹ (2011)
 University of Pisa (2010)
 University of Siena (2015)

 Japan
 Kwansei Gakuin University¹ (2011)
 Kyoto Bunkyo University (1999)
 Osaka University¹ (2001)
 Saitama University (2015)
 Tohoku University¹ (2011)

 Kazakhstan
 L.N. Gumilyov Eurasian National University (2015)

 Korea
 Korea Advanced Institute of Science and Technology (2013)
 Republic of Korea Army¹ (2013)
 Seoul National University¹ (1997)
 Soonchunhyang University¹ (1999)

 Mexico
 Benemérita Universidad Autónoma de Puebla (2012)
 Consejo Nacional de Ciencia y Tecnologia (CONACYT) (2012)
 Fundación Universidad de las Américas, Puebla¹ (2013)
 Universidad de las Americas Puebla (UDLAP)
 Instituto Tecnológico Y de Estudios Superiores De Monterrey¹ (2002)
 Instituto Tecnológico y de Estudios Superiores de Occidente (2012)
 Universidad de las Americas, Puebla¹ (2013)

 Namibia
 University of Namibia (2010)

 Netherlands, The
Erasmus School of Economics\textsuperscript{1} (2012)
Tilburg University\textsuperscript{1} (2012)
Universiteit Maastricht\textsuperscript{1} (1998)

New Zealand
Victoria University of Wellington\textsuperscript{1} (2008)

Nigeria
University of Ilorin (2011)

Norway
BI Norwegian School of Management\textsuperscript{1} (2001)
University of Stavanger (2003)

Pakistan
Habib University Foundation (2010)

Panama
International Maritime University (2013)

Peru
Centro de Ornitología y Bioversidad (CORBIDI) (2013)
Universidad Nacional de Ingeniería (2014)
Universidad Peruana Cayetano Heredia (2007)

Qatar
Qatar University (2013)

Romania
Universitatea Tehnica din Cluj-Napoca (2014)

Russia
National Research Tomsk Polytechnic University (2012)

Singapore
National University of Singapore\textsuperscript{1} (1996)

Spain
Abat Oliba CEU University\textsuperscript{1} (2013)
Universidad Autónoma de Barcelona\textsuperscript{1} (2005)
Universidad Carlos III de Madrid\textsuperscript{1} (1998)
Universidad de Córdoba\textsuperscript{1} (2006)
Universitat Pompeu Fabra\textsuperscript{1} (1998)
Zaragoza Logistics Center (2012)

Sweden
Jönköping International Business School\textsuperscript{1} (2001)

Switzerland
Université De Lausanne\textsuperscript{1} (2000)

Taiwan
National Taiwan University\textsuperscript{1} (2000)

United Kingdom
Aberystwyth University\textsuperscript{1} (2011)
Lancaster University\textsuperscript{1} (2013)
Swansea University\textsuperscript{1} (2010)
University of Aberdeen (2015)
University of Leicester\textsuperscript{1} (2007)
University of Nottingham\textsuperscript{1} (2002)
\textsuperscript{1} Agreement includes a REEP.

Scholastic Honor Societies

<table>
<thead>
<tr>
<th>Society Name</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha Epsilon Delta</td>
<td>Premedical/Predental</td>
</tr>
<tr>
<td>Alpha Eta Mu Beta</td>
<td>Bioengineering</td>
</tr>
<tr>
<td>Alpha Kappa Delta</td>
<td>Sociology</td>
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<td>Alpha Nu Sigma</td>
<td>Nuclear Science</td>
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<tr>
<td>Alpha Pi Mu</td>
<td>Industrial Engineering</td>
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<td>Alpha Zeta</td>
<td>Agriculture</td>
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<td>Chi Epsilon</td>
<td>Civil Engineering</td>
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<tr>
<td>Eta Kappa Nu</td>
<td>Electrical Engineering</td>
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<td>Kappa Delta Pi</td>
<td>Education</td>
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<td>Kappa Theta Epsilon</td>
<td>Cooperative Education</td>
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<td>Lambda Sigma</td>
<td>Sophomores</td>
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<td>Lambda Pi Eta</td>
<td>Communication</td>
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<td>National Society of Collegiate</td>
<td>Freshmen and Sophomores</td>
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<td>Scholars</td>
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<td>Omega Chi Epsilon</td>
<td>Chemical Engineering</td>
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<tr>
<td>Omega Epsilon</td>
<td>Ocean Engineering</td>
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<tr>
<td>Phi Alpha Theta</td>
<td>History (international)</td>
</tr>
<tr>
<td>Phi Eta Sigma</td>
<td>Freshmen</td>
</tr>
<tr>
<td>Pi Alpha Xi</td>
<td>Floriculture</td>
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<tr>
<td>Pi Epsilon Tau</td>
<td>Petroleum Engineering</td>
</tr>
</tbody>
</table>
Since 1950, students and faculty of Texas A&M University have benefited from its membership in Oak Ridge Associated Universities (ORAU). ORAU is a consortium of 101 colleges and universities and a contractor for the U.S. Department of Energy (DOE) located in Oak Ridge, Tennessee. ORAU works with its member institutions to help their students and faculty gain access to federal research facilities throughout the country; to keep its members informed about opportunities for fellowship, scholarship and research appointments; and to organize research alliances among its members.

Through the Oak Ridge Institute for Science and Education (ORISE), the DOE facility that ORAU operates, undergraduates, graduates, postgraduates, as well as faculty enjoy access to a multitude of opportunities for study and research. Students can participate in programs covering a wide variety of disciplines including business, Earth sciences, epidemiology, engineering, physics, geological sciences, pharmacology, ocean sciences, biomedical sciences, nuclear chemistry and mathematics. Appointment and program length range from one month to four years. Many of these programs are especially designed to increase the numbers of underrepresented minority students pursuing degrees in science- and engineering-related disciplines. A comprehensive listing of these programs and other opportunities, their disciplines, and details on locations and benefits can be found in the ORISE Catalog of Education and Training Programs, which is available at http://see.orau.org, or by calling the contact below.

ORAU’s Office of Partnership Development seeks opportunities for partnerships and alliances among ORAU’s members, private industry, and major federal facilities. Activities include faculty development programs, such as the Ralph E. Powe Junior Faculty Enhancement Awards, the Visiting Industrial Scholars Program, consortium research funding initiatives, faculty research and support programs as well as services to chief research officers.

For more information about ORAU and its programs, visit www.orau.org or contact:

Glen A. Laine
Vice President for Research
ORAU Councilor for Texas A&M University
(979) 845-8585

Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act (Clery Act)

(Formerly Student Right to Know and Campus Security Act of 1990)

In compliance with federal law, the following information is maintained and available through the office listed below:

Campus Crime Statistics and Security Policies

An Annual Security Report is available that includes information on campus security policies and statistics. Security policies include: reporting crimes and emergencies, security resources, crime awareness and prevention, security of campus facilities and residence halls, alcohol, drug and weapon violations. The Annual Security Report can be found at this website (https://upd.tamu.edu/Current%20Disclosures/Annual%20Security%20Report.pdf). A paper copy is available upon request.

Department of Security and University Police
Texas A&M University
MS 1231
College Station, Texas 77843-1231
(979) 845-2345
http://upd.tamu.edu

Higher Education Campus Fire Safety Standards and Measures

In compliance with federal law, the following information is maintained and available through Environmental Health and Safety as listed below.

Campus Fire Statistics and Fire Safety Policies

An annual campus housing fire safety report is available that includes information on fire safety systems and fire statistics for on-campus student housing facilities. The Annual Fire Safety Report on Student Housing is available at this website (https://ehsd.tamu.edu/Fire%20Life%20Safety%20Documents/Annual%20Fire%20Safety%20Report%20on%20Student%20Housing%20(1).pdf). A paper copy is available upon request at the address below.

Environmental Health and Safety
4472 TAMU
College Station, Texas 77843-4472
http://ehsd.tamu.edu
Education Code - Hazing

Education Code § 51.936 requirement to publish a summary of Education Code Ch. 37, subchapter F. Hazing in the University Catalog

The following is a summary of Chapter 37, subchapter F. (§§ 37.151-157) of the Texas Education Code, which prohibits hazing in Texas public or private high schools. Texas Education Code §51.936 applies Ch. 37’s prohibition on hazing to institutions of higher education. This summary of Chapter 37 is provided as required by § 51.936(d).

Summary

Hazing is a criminal violation under Texas law. A person may be found guilty of criminal conduct for hazing, encouraging hazing, permitting hazing, or having knowledge of the planning of hazing incidents and failure to report in writing his/her knowledge to the Dean of Students.

Both failing to report hazing and hazing that does not result in serious bodily injury are Class B misdemeanors. Hazing that results in serious bodily injury is a Class A misdemeanor. Hazing resulting in a death is a state jail felony. An organization found guilty of hazing may be fined $5,000 to $10,000 or, for incidents causing personal injury or property damage, an amount double the loss or expenses incurred because of the hazing incident. It is not a defense to prosecution that the person hazed consented to the hazing activity.

Any person reporting a specific hazing incident to the Dean of Students or other appropriate institutional official is immune from civil and criminal liability unless the report is in bad faith or malicious.

The state law does not limit or affect an educational institution’s right to enforce its own penalties against hazing.

The Education Code defines hazing as “any intentional, knowing, or reckless act occurring on or off the campus of an educational institution, by one person or acting with others, directed against a student, that endangers the mental or physical health or safety of a student for the purpose of pledging, being initiated into, affiliating with, holding office in, or maintaining membership in an organization.” The statute contains a list of conduct which constitutes hazing.

In order to report suspected incidents of hazing, please contact either the Office of the Dean of Student Life at (979) 845-3111 or the Texas A&M University Police Department at (979) 845-2345. For information on how to report suspected incidents of hazing, go to http://stophazing.tamu.edu/report.
## Index

### A

- AALO - Arabic & Asian Language ........................................ 591
- Accounting - BBA .................................................. 215
- ACCT - Accounting .................................................. 591
- Admission ........................................................... 39
- Advanced Research Methods in Political Sciences - Certificate ...... 485
- Advertising Strategy - Certificate .................................. 237
- AERO - Aerospace Engineering ...................................... 594
- Aerospace Engineering - BS ....................................... 297
- Aerospace Engineering - Minor ................................... 298
- Aerospace Studies ................................................... 585
- AERS - Aerospace Studies .......................................... 600
- Africana Studies - Minor ........................................... 417
- AFST - Africana Studies ............................................ 601
- AGCJ - Ag Comm & Journalism .................................. 603
- AGEC - Agricultural Economics .................................. 605
- AGLS - Ag & Life Sciences ...................................... 610
- Agribusiness - BS .................................................. 107
- Agricultural Communications and Journalism - BS .............. 119
- Agricultural Communications and Journalism - Minor .......... 122
- Agricultural Economics - 5-Year Bachelor of Science/Master of Public Service Administration ......................... 115
- Agricultural Economics - BS, Finance and Real Estate Option 109
- Agricultural Economics - BS, Food Marketing Systems Option 110
- Agricultural Economics - BS, Policy and Economic Analysis Option 112
- Agricultural Economics - BS, Rural Entrepreneurship Option 113
- Agricultural Economics - Minor .................................. 117
- Agricultural Leadership and Development - BS .............. 120
- Agricultural Science - BS ......................................... 121
- Agricultural Systems Management - BS .......................... 134
- Agricultural Systems Management - Minor ......................... 137
- Agronomy - Minor .................................................. 184
- AGSC - Agricultural Science ..................................... 611
- AGSM - Agricultr Systems Mgmt .................................. 612
- ALEC - Ag Leadership, Ed & Comm .................................. 614
- ALED - Ag Leadership & Dev ...................................... 617
- Analytics and Consulting - Certificate .......................... 238
- Animal Science - BS, Production/Industry Option .............. 125
- Animal Science - BS, Science Option .............................. 127
- Animal Science - Minor ............................................ 128
- ANSC - Animal Science ........................................... 619
- ANTH - Anthropology ............................................. 625
- Anthropology - BA .................................................. 426
- Anthropology - BA, Archaeology Track ........................ 427
- Anthropology - Minor ............................................. 428
- Appendices .......................................................... 1094
- Applied Learning in Science, Technology, Engineering and Mathematics (STEM) Minor ........................................... 287
- Applied Mathematical Sciences - BS, Actuarial Emphasis .......... 551
- Applied Mathematical Sciences - BS, Biological Science Emphasis ...... 552
- Applied Mathematical Sciences - BS, Computational Emphasis .......... 553
- Applied Mathematical Sciences - BS, Economics Emphasis .............. 555
- Applied Mathematical Sciences - BS, Math Emphasis ............. 556
- Applied Mathematical Sciences - BS, Statistics Emphasis .......... 557
- ARAB - Arabic ....................................................... 633
- Arabic Studies - Minor ............................................ 472
- ARCH - Architecture ............................................... 634
- Art - Minor ........................................................... 206
- Art and Architecture History - Minor ................................ 195
- Artie McFerrin Department of Chemical Engineering ............. 302
- ARTS - Art ......................................................... 640
- ASIA - Asian Studies ............................................... 642
- Asian Studies - Minor ............................................ 472
- ASTR - Astronomy ................................................... 643
- Astrophysics - Minor ............................................. 566
- ATMO - Atmospheric Sciences .................................... 644
- BAEN - Biological & Ag Engr .................................... 647
- BEFB-Bilingual Ed Field Based .................................. 651
- BESC - Bioenvironmental Sci .................................... 652
- BICH - Biochemistry .................................................. 653
- BIMS - Biomedical Science ........................................ 656
- Biochemistry - BS .................................................. 130
- Biochemistry - Minor ............................................. 132
- Bioenvironmental Sciences - BS .................................. 165
- Bioenvironmental Sciences - Minor .................................. 169
- BIOL - Biology ....................................................... 660
- Biological and Agricultural Engineering - BS .................... 135
- Biological and Agricultural Engineering - BS .................... 293
- Biology - BA .......................................................... 524
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology - BS</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Biology - BS</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Biomedical Engineering - BS</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Biomedical Engineering - BS</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Biomedical Research and Development</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Biomedical Sciences - BS</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Biomedical Sciences - Minor</td>
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</tr>
<tr>
<td>BMEN - Biomedical Engineering</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Board of Regents and Administrative</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>BOTN - Botany</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Business Administration - Minor</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Business Administration - Minor</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Business Economics - Certificate</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Business Honors - BBA</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>BUSN - Mays Business School</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>C</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Campus Life</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>CARC - College of Architecture</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Caruth School of Dental Hygiene</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>CEHD - Coll of Ed &amp; Human Dev</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>CHEM - Chemistry</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Chemical Engineering - BS</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Chemical Engineering - Minor</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Chemistry - BA</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Chemistry - BA, Biological Chemistry</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Chemistry - BA, Chemical Education</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Chemistry - BA, Environmental</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Chemistry - BS</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Chemistry - BS, Biological-Chemistry</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Chemistry - BS, Environmental</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Chemistry - Minor</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>CHEN - Chemical Engineering</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>CHIN - Chinese</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Chinese - Minor</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Civil Engineering - BS</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Civil Engineering - BS</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Civil Engineering - BS, Construction</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Civil Engineering - BS, Environmental</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Civil Engineering - BS, General Civil</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Civil Engineering - BS, Geotechnical</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Civil Engineering - BS, Structural</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Civil Engineering - BS, Transportation</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Civil Engineering - BS, Water</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>CLAS - Classics</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Classical Studies - Minor</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Classics - BA, Classical Civilization</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Classics - BA, Language and Literature</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Climate Change - Minor</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Coaching - Minor</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>College of Agriculture and Life</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>College of Architecture</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>College of Education and Human</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>College of Geosciences</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>College of Liberal Arts</td>
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</tr>
<tr>
<td>College of Nursing</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>College of Science</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>College of Veterinary Medicine and</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>College of Veterinary Medicine and</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>COMM - Communication</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Commercial Banking - Certificate</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Communication - BA</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Communication - Minor</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Communication and Global Media -</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Communication Leadership and</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Community Development - BS</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Community Health - BS</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Comparative Cultural Studies</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Comparative Cultural Studies U.S.</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Comparative Study of National</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Computer Engineering - BS, Computer</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Computer Engineering - BS, Electrical</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Computer Science - BS</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Computer Science - Minor</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Construction Science - BS</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>COSC - Construction Science</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Course Descriptions</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Creative Studies - Certificate</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Creative Studies - Minor</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>CSCE - Computer Sci &amp; Engr</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>CVEN - Civil Engineering</td>
<td>..................................................................................................................</td>
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<tr>
<td>D</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Dance - Minor</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>DASC - Dairy Science</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>Data Center Operations Engineering</td>
<td>..................................................................................................................</td>
</tr>
<tr>
<td>DCED - Dance Education</td>
<td>..................................................................................................................</td>
</tr>
</tbody>
</table>

1106 Index
<table>
<thead>
<tr>
<th>Department</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DDDS - Doctor Dental Surgery</td>
<td>717</td>
</tr>
<tr>
<td>DDHS - Dental Hygiene</td>
<td>723</td>
</tr>
<tr>
<td>Degree Information</td>
<td>24</td>
</tr>
<tr>
<td>Dental Hygiene - BS</td>
<td>242</td>
</tr>
<tr>
<td>Department of Accounting</td>
<td>213</td>
</tr>
<tr>
<td>Department of Aerospace Engineering</td>
<td>295</td>
</tr>
<tr>
<td>Department of Agricultural Economics</td>
<td>105</td>
</tr>
<tr>
<td>Department of Agricultural Leadership, Education, and Communications</td>
<td>118</td>
</tr>
<tr>
<td>Department of Animal Science</td>
<td>123</td>
</tr>
<tr>
<td>Department of Anthropology</td>
<td>424</td>
</tr>
<tr>
<td>Department of Architecture</td>
<td>191</td>
</tr>
<tr>
<td>Department of Atmospheric Sciences</td>
<td>371</td>
</tr>
<tr>
<td>Department of Biochemistry/Biophysics</td>
<td>129</td>
</tr>
<tr>
<td>Department of Biological and Agricultural Engineering</td>
<td>133</td>
</tr>
<tr>
<td>Department of Biology</td>
<td>519</td>
</tr>
<tr>
<td>Department of Biomedical Engineering</td>
<td>298</td>
</tr>
<tr>
<td>Department of Chemistry</td>
<td>530</td>
</tr>
<tr>
<td>Department of Communication</td>
<td>428</td>
</tr>
<tr>
<td>Department of Computer Science &amp; Engineering</td>
<td>326</td>
</tr>
<tr>
<td>Department of Construction Science</td>
<td>196</td>
</tr>
<tr>
<td>Department of Economics</td>
<td>436</td>
</tr>
<tr>
<td>Department of Ecosystem Science and Management</td>
<td>137</td>
</tr>
<tr>
<td>Department of Educational Administration and Human Resource Development</td>
<td>247</td>
</tr>
<tr>
<td>Department of Educational Psychology</td>
<td>251</td>
</tr>
<tr>
<td>Department of Electrical &amp; Computer Engineering</td>
<td>329</td>
</tr>
<tr>
<td>Department of Engineering Technology and Industrial Distribution</td>
<td>335</td>
</tr>
<tr>
<td>Department of English</td>
<td>444</td>
</tr>
<tr>
<td>Department of Entomology</td>
<td>145</td>
</tr>
<tr>
<td>Department of Finance</td>
<td>217</td>
</tr>
<tr>
<td>Department of Geography</td>
<td>375</td>
</tr>
<tr>
<td>Department of Geology and Geophysics</td>
<td>393</td>
</tr>
<tr>
<td>Department of Health and Kinesiology</td>
<td>258</td>
</tr>
<tr>
<td>Department of Hispanic Studies</td>
<td>449</td>
</tr>
<tr>
<td>Department of History</td>
<td>453</td>
</tr>
<tr>
<td>Department of Horticultural Sciences</td>
<td>153</td>
</tr>
<tr>
<td>Department of Industrial and Systems Engineering</td>
<td>153</td>
</tr>
<tr>
<td>Department of Information and Operations Management</td>
<td>341</td>
</tr>
<tr>
<td>Department of Information Technology and Operations Management</td>
<td>221</td>
</tr>
<tr>
<td>Department of International Studies</td>
<td>456</td>
</tr>
<tr>
<td>Department of Landscape Architecture and Urban Planning</td>
<td>199</td>
</tr>
<tr>
<td>Department of Management</td>
<td>226</td>
</tr>
<tr>
<td>Department of Marketing</td>
<td>229</td>
</tr>
<tr>
<td>Department of Materials Science and Engineering</td>
<td>344</td>
</tr>
<tr>
<td>Department of Mathematics</td>
<td>546</td>
</tr>
<tr>
<td>Department of Mechanical Engineering</td>
<td>345</td>
</tr>
<tr>
<td>Department of Nuclear Engineering</td>
<td>350</td>
</tr>
<tr>
<td>Department of Nutrition and Food Science</td>
<td>155</td>
</tr>
<tr>
<td>Department of Oceanography</td>
<td>402</td>
</tr>
<tr>
<td>Department of Performance Studies</td>
<td>475</td>
</tr>
<tr>
<td>Department of Philosophy and Humanities</td>
<td>479</td>
</tr>
<tr>
<td>Department of Physics and Astronomy</td>
<td>562</td>
</tr>
<tr>
<td>Department of Plant Pathology and Microbiology</td>
<td>165</td>
</tr>
<tr>
<td>Department of Political Science</td>
<td>480</td>
</tr>
<tr>
<td>Department of Poultry Science</td>
<td>169</td>
</tr>
<tr>
<td>Department of Psychology</td>
<td>490</td>
</tr>
<tr>
<td>Department of Public Health Studies</td>
<td>513</td>
</tr>
<tr>
<td>Department of Recreation, Park and Tourism Sciences</td>
<td>171</td>
</tr>
<tr>
<td>Department of Small Animal Clinical Sciences</td>
<td>581</td>
</tr>
<tr>
<td>Department of Sociology</td>
<td>493</td>
</tr>
<tr>
<td>Department of Soil and Crop Sciences</td>
<td>179</td>
</tr>
<tr>
<td>Department of Statistics</td>
<td>567</td>
</tr>
<tr>
<td>Department of Teaching, Learning and Culture</td>
<td>280</td>
</tr>
<tr>
<td>Department of Veterinary Integrative Biosciences</td>
<td>576</td>
</tr>
<tr>
<td>Department of Veterinary Large Animal Clinical Sciences</td>
<td>578</td>
</tr>
<tr>
<td>Department of Veterinary Pathobiology</td>
<td>578</td>
</tr>
<tr>
<td>Department of Veterinary Physiology and Pharmacology</td>
<td>580</td>
</tr>
<tr>
<td>Department of Visualization</td>
<td>204</td>
</tr>
<tr>
<td>Department of Wildlife and Fisheries Sciences</td>
<td>184</td>
</tr>
<tr>
<td>Diversity - Certificate</td>
<td>207</td>
</tr>
<tr>
<td>Diversity - Certificate</td>
<td>371</td>
</tr>
<tr>
<td>Diversity - Certificate</td>
<td>423</td>
</tr>
<tr>
<td>Dwight Look College of Engineering</td>
<td>288</td>
</tr>
</tbody>
</table>

E

<table>
<thead>
<tr>
<th>Department</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earth Sciences - Minor</td>
<td>369</td>
</tr>
<tr>
<td>ECEN - Electrical &amp; Comp Engr</td>
<td>725</td>
</tr>
<tr>
<td>ECHE-Early Childhd Ed Fd Based</td>
<td>736</td>
</tr>
<tr>
<td>ECMT - Econometrics</td>
<td>736</td>
</tr>
<tr>
<td>Ecological Restoration - BS</td>
<td>138</td>
</tr>
<tr>
<td>ECON - Economics</td>
<td>737</td>
</tr>
<tr>
<td>Economics - 5-Year Bachelor of Arts/Master of International Affairs</td>
<td>439</td>
</tr>
<tr>
<td>Economics - 5-Year Bachelor of Arts/Master of Public Service Administration</td>
<td>439</td>
</tr>
<tr>
<td>Economics - 5-Year Bachelor of Science/Master of International Affairs</td>
<td>441</td>
</tr>
<tr>
<td>Economics - 5-Year Bachelor of Science/Master of Public Service Administration</td>
<td>442</td>
</tr>
</tbody>
</table>
Economics - 5-Year Bachelor of Science/Master of Science in Economics ........................................ 440
Economics - BA ......................................................................................................................... 437
Economics - BS ..................................................................................................................... 438
Economics - Minor ..................................................................................................................... 443
EDCI - Educ Curriculum & Dev .................................................................................................. 741
EDTC - Educational Technology .................................................................................................. 747
Education Code - Hazing ............................................................................................................. 1104
EHRE - Ed Human Res Develop ................................................................................................. 748
Electrical Engineering - BS ......................................................................................................... 334
Electrical Engineering - Minor ..................................................................................................... 335
Electronic Systems Engineering Technology - BS ........................................................................ 337
Embedded Systems Integration - Minor ....................................................................................... 341
ENDG - Engr Design Graphics .................................................................................................... 753
ENDS - Environmental Design .................................................................................................... 753
Energy Accounting - Certificate .................................................................................................. 217
Energy Engineering - Certificate ................................................................................................ 357
Engineering Systems Management - Certificate ......................................................................... 343
Engineering Technology - BS, Manufacturing and Mechanical Engineering Option ................ 338
Engineering Therapeutics Manufacturing - Certificate ................................................................. 301
ENGL - English .......................................................................................................................... 753
English - BA ............................................................................................................................... 447
English - BA, Middle School Teacher Certification ....................................................................... 448
ENGR - Engineering .................................................................................................................... 761
ENST-Environmental Studies ....................................................................................................... 762
ENTC - Engineering Technology .................................................................................................. 763
ENTO - Entomology ..................................................................................................................... 763
Entomology - BS ........................................................................................................................ 146
Entomology - Minor .................................................................................................................... 151
Entrepreneurial Leadership - Certificate ...................................................................................... 229
Environmental Design Architectural Studies - BED ................................................................. 194
Environmental Geosciences - 5-Year Bachelor of Science/Master of Science in Oceanography ...... 366
Environmental Geosciences - BS ................................................................................................ 360
Environmental Geosciences - Minor ........................................................................................... 370
Environmental Soil Science - Minor ............................................................................................ 184
Environmental Studies - BS ......................................................................................................... 166
Environmental Studies - BS ......................................................................................................... 363
EPFB - Educ Psyc Field Based .................................................................................................... 766
EPSY - Educational Psychology ................................................................................................ 767
Equine Science - Certificate ......................................................................................................... 128
ESDS - Environmental Design .................................................................................................... 787
ESFM - Environmental Science & Management ........................................................................ 761
ESMM - Environmental Studies & Management ....................................................................... 392
ESST - Environmental Studies ..................................................................................................... 762
GEOG - Geography ..................................................................................................................... 796
GEOG - Geography and Environment ......................................................................................... 796
GEOG - Geography and Environment ......................................................................................... 796
GEOG - Geography ..................................................................................................................... 796
GEOG - Geography ..................................................................................................................... 796
GEOG - Geography ..................................................................................................................... 796
Geographic Information Science and Technology (GIST) - Minor ............................................... 392
Geographic Information Science and Technology - BS, Computation, Design and Analysis Track .................................................. 376
Geographic Information Science and Technology - BS, Earth Systems Analysis Track ............... 378
Geographic Information Science and Technology - BS, Human Systems and Society Track ....... 380
Geography - BS ........................................................................................................................ 382
Geography - BS, Geography of the Natural Environment Track ............................................... 386
Geography - BS, Human Geography Track ................................................................................ 384
<table>
<thead>
<tr>
<th>Index</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLTH - Health</td>
<td>393</td>
</tr>
<tr>
<td>Horticulture - BS, Allied Health Track</td>
<td>265</td>
</tr>
<tr>
<td>HORT - Horticultural Sciences</td>
<td>827</td>
</tr>
<tr>
<td>Housing</td>
<td>70</td>
</tr>
<tr>
<td>HUMAN - Humanities</td>
<td>832</td>
</tr>
<tr>
<td>Human Resource Development - BS</td>
<td>249</td>
</tr>
<tr>
<td>Human Resource Development - Minor</td>
<td>251</td>
</tr>
<tr>
<td>IBUS - International Business</td>
<td>832</td>
</tr>
<tr>
<td>IDIS - Industrial Distribution</td>
<td>834</td>
</tr>
<tr>
<td>Industrial Distribution - BS</td>
<td>339</td>
</tr>
<tr>
<td>Industrial Engineering - BS</td>
<td>342</td>
</tr>
<tr>
<td>Industrial Engineering - Minor</td>
<td>343</td>
</tr>
<tr>
<td>INST - Interdisciplinary Studies</td>
<td>836</td>
</tr>
<tr>
<td>Interdepartmental Degree Programs</td>
<td>105</td>
</tr>
<tr>
<td>Interdisciplinary Programs</td>
<td>97</td>
</tr>
<tr>
<td>Interdisciplinary Studies - BS, Bilingual Education EC-6</td>
<td>253</td>
</tr>
<tr>
<td>Interdisciplinary Studies - BS, Pre-K-6, Generalist Certification</td>
<td>283</td>
</tr>
<tr>
<td>Interdisciplinary Studies - BS, Special Education EC-12</td>
<td>255</td>
</tr>
<tr>
<td>Interdisciplinary Studies, BS, Environmental Studies Track</td>
<td>461</td>
</tr>
<tr>
<td>International Agreements</td>
<td>1099</td>
</tr>
<tr>
<td>International Agricultural Development - Minor</td>
<td>123</td>
</tr>
<tr>
<td>International and Cultural Diversity Requirements</td>
<td>34</td>
</tr>
<tr>
<td>International Certificate in Cultural Competency and Communications in Spanish</td>
<td>581</td>
</tr>
<tr>
<td>International Opportunities for Students</td>
<td>91</td>
</tr>
<tr>
<td>International Relations - Certificate</td>
<td>488</td>
</tr>
<tr>
<td>International Studies - 5-Year Bachelor of Arts and Master of International Affairs</td>
<td>467</td>
</tr>
<tr>
<td>International Studies - BA, Environmental Studies Track</td>
<td>461</td>
</tr>
<tr>
<td>International Studies - BA, Global Cultural Studies Track</td>
<td>464</td>
</tr>
<tr>
<td>International Studies - BA, International Commerce Track</td>
<td>458</td>
</tr>
<tr>
<td>International Studies - BA, International Communication and Media Track</td>
<td>459</td>
</tr>
<tr>
<td>International Studies - BA, International Geographic Information Systems Track</td>
<td>463</td>
</tr>
<tr>
<td>International Studies - BA, International Politics and Diplomacy Track</td>
<td>466</td>
</tr>
<tr>
<td>International Trade and Agriculture - Certificate</td>
<td>118</td>
</tr>
<tr>
<td>INTS - International Studies</td>
<td>837</td>
</tr>
<tr>
<td>Investment Banking - Certificate</td>
<td>220</td>
</tr>
<tr>
<td>ISEN - Indus &amp; Systems Engr</td>
<td>838</td>
</tr>
<tr>
<td>ISYS - Mgmt Info Systems</td>
<td>843</td>
</tr>
<tr>
<td>ITAL - Italian</td>
<td>846</td>
</tr>
<tr>
<td>Italian - Minor</td>
<td>474</td>
</tr>
</tbody>
</table>
# Index

## J
- Japanese - Minor .................................................. 474
- JAPN - Japanese ..................................................... 847
- Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act (Clery Act) ........................................ 1103
- JOUR - Journalism ................................................... 848
- Journalism - Minor ................................................... 420

## K
- KINE - Kinesiology .................................................. 849
- Kinesiology - BS, All-Level Physical Education Teacher Certification Track .................................................. 268
- Kinesiology - BS, Dance Science Track ..................................... 269
- Kinesiology - BS, Exercise Science Track, Applied Exercise Physiology Concentration ........................................ 270
- Kinesiology - BS, Exercise Science Track, Basic Exercise Physiology Concentration ........................................ 271
- Kinesiology - BS, Exercise Science Track, Motor Behavior Concentration .................................................. 272
- KNFB - Kinesiology Field Based ......................................... 854

## L
- LAND - Landscape Architecture ...................................... 854
- Landscape Architecture - BLA ........................................ 201
- Latino/a and Mexican-American Studies - Minor .................. 499
- Law, Politics, and Society - Certificate ................................ 488
- LBAR - College of Liberal Arts ....................................... 857
- LDEV - Land Development ............................................. 858
- Leadership - Minor ..................................................... 123
- Leadership - Minor ..................................................... 420
- Liberal Arts Honors - Minor .......................................... 421
- LING - Linguistics ....................................................... 859

## M
- Management - BBA .................................................... 227
- Management Information Systems - BBA .......................... 222
- Marketing - BBA ......................................................... 231
- Marketing - BBA, Advertising Strategy Track ......................... 234
- Marketing - BBA, Analytics and Consulting Track .................. 236
- Marketing - BBA, Professional Selling and Sales Management Track .................................................. 232
- Marketing - BBA, Retail Buying and Management Track .......... 235
- MASC - Integrated Math & Sci ........................................ 860
- Materials Science and Engineering - Minor ........................ 345
- MATH - Mathematics .................................................... 860
- Mathematics - BA ....................................................... 559
- Mathematics - BS ....................................................... 560
- Mathematics - Minor .................................................... 561
- Mays Business School .................................................. 208
- Meat Science - Certificate ............................................. 128
- Mechanical Engineering - BS ........................................ 348
- MEEN - Mechanical Engineering ...................................... 869
- MEFB - Mid Grds Ed Field Based ..................................... 877
- MEPS-Molecular & Env Plant Sci ....................................... 878
- Meteorology - 5-Year Bachelor of Science/Master of Science in Oceanography .................................................. 373
- Meteorology - BS ....................................................... 372
- Meteorology - Minor .................................................... 373
- MGMT - Management ................................................... 879
- MICR - Microbiology .................................................... 885
- Microbiology - BS ....................................................... 526
- Military Science ......................................................... 586
- Military Studies - Minor ................................................. 584
- MKTG - Marketing ....................................................... 886
- MLSC - Military Science ................................................ 889
- MMET - Mfg & Mech Engr Tech ....................................... 889
- Modern Languages - BA, French Option .............................. 469
- Modern Languages - BA, German Option ............................. 470
- Modern Languages - BA, Russian Option ............................. 471
- MODL - Modern Languages ............................................ 891
- Molecular and Cell Biology - BS ....................................... 527
- MSEN -Materials Science & Engr ..................................... 892
- MUSC - Music ............................................................ 895
- Museum Studies - Minor ................................................. 428
- Music - BA ............................................................... 475
- Music - Minor ............................................................ 478

## N
- Naval Science ........................................................... 586
- Neuroscience ............................................................ 97
- Neuroscience - Certificate .............................................. 98
- Neuroscience - Minor ................................................... 97
- NRSC - Neuroscience ................................................... 899
- Nuclear Engineering - BS .............................................. 351
- Nuclear Engineering - Minor ........................................... 354
- NUEN - Nuclear Engineering ........................................... 902
- NURS - Nursing ........................................................ 907
- Nursing - BS, RN to BSN Track ....................................... 511
- Nursing - BS, Second Degree BSN Track .............................. 509
- Nursing - BS, Select BSN Track ....................................... 510
- Nursing - BS, Traditional BSN ......................................... 508
- NUTR - Nutrition ........................................................ 910
Nutrition - BS, Didactic Program in Dietetics Track ........................................... 160
Nutrition - BS, General Nutrition Track ............................................................ 161
Nutrition - BS, Molecular and Experimental Track ............................................ 163
NVSC - Naval Science ......................................................................................... 914
O
Oak Ridge Associated Universities (ORAU) ................................................... 1103
Ocean Engineering - BS ..................................................................................... 324
Oceanography - Minor ........................................................................................ 403
OCEN - Ocean Engineering .................................................................................. 914
OCNG - Oceanography ........................................................................................ 916
Orientation ............................................................................................................. 71
P
Park and Natural Resource Management - Minor ............................................. 178
PERF - Performance Studies ............................................................................... 920
Performance Technology - Minor ...................................................................... 478
PETE - Petroleum Engineering ............................................................................ 922
Petroleum Engineering - BS ............................................................................... 356
Petroleum Engineering - Minor .......................................................................... 357
PHIL - Philosophy ................................................................................................ 928
Philosophy - BA .................................................................................................... 479
Philosophy - Minor ............................................................................................... 480
PHLT - Public Health ............................................................................................ 932
PHYS - Physics ....................................................................................................... 934
Physics - BA ........................................................................................................... 564
Physics - BS ........................................................................................................... 565
Physics - Minor ...................................................................................................... 566
Plant and Environmental Soil Science - BS, Crops Emphasis ............................. 181
Plant and Environmental Soil Science - BS, Soil and Water Emphasis ............. 182
PLPA - Plant Pathology ........................................................................................ 938
Political Science - 5-Year Bachelor of Arts/Master of Public Service Administration .......................................................... 484
Political Science - 5-Year Bachelor of Science/Master of Public Service Administration .......................................................... 484
Political Science - BA ........................................................................................... 483
Political Science - BS ............................................................................................ 483
POLS - Political Science ...................................................................................... 940
PORT - Portuguese ............................................................................................... 947
POSC - Poultry Science ....................................................................................... 947
Poultry Science - BS, Industry Emphasis .............................................................. 169
Poultry Science - BS, Technical Emphasis ........................................................... 170
Poultry Science - Minor ......................................................................................... 171
Professional Event Manager - Certificate ......................................................... 179
Professional Selling and Sales Management - Certificate .............................. 239
PSYC - Psychology .............................................................................................. 950
Psychology - BA .................................................................................................... 492
Psychology - BS .................................................................................................... 492
Psychology - Minor ............................................................................................... 493
Public Health - BS ................................................................................................. 513
Public Health Entomology - Certificate ............................................................... 152
Q
Quality Engineering for Regulated Medical Technologies - Certificate ............. 301
Quantitative Economic Methods - Certificate ...................................................... 444
R
Race, Ethnicity, and Gender Politics - Certificate ............................................... 489
Radiological Health Engineering - BS ................................................................. 353
Radiological Health Engineering - Minor ............................................................. 354
Rangeland Ecology and Management - BS, Ranch Management Option .......... 140
Rangeland Ecology and Management - BS, Rangeland Resources Option ........ 141
Rangeland Ecology and Management - Minor .................................................... 145
RDNG - Reading .................................................................................................... 955
Recreation, Park and Tourism Sciences - BS, Community Recreation and Park Administration Certificate .............................. 174
Recreation, Park and Tourism Sciences - BS, Parks and Conservation Certificate .......................................................... 175
Recreation, Park and Tourism Sciences - BS, Tourism Management Certificate .......................................................... 176
Recreation, Park and Tourism Sciences - BS, Youth Development Certificate .......................................................... 177
Registration and Academic Status ........................................................................ 66
Religious Studies - Minor ..................................................................................... 421
RELS - Religious Studies ....................................................................................... 957
Renewable Natural Resources - BS ..................................................................... 142
Renewable Natural Resources - BS ..................................................................... 178
Renewable Natural Resources - BS ..................................................................... 185
RENR-Renewable Natural Resources .................................................................. 959
Retail Buying and Management - Certificate ..................................................... 238
RLEM-Rangeland Ecology & Mgmt ................................................................. 960
RPTS - Rec, Park & Tourism Sci ......................................................................... 960
Rules and Regulations for Determining Residence Status ..................................... 1094
RUSS - Russian .................................................................................................... 964
Russian - Minor .................................................................................................... 475
S
SCEN - College of Science .................................................................................. 966
Scholastic Honor Societies .................................................................................... 1102
School of Military Science ................................................................................... 584
School of Public Health .......................................................................................... 512
Index

SCMT - Supply Chain Mgmt ........................................ 966
SCSC - Soil and Crop Sciences .................................... 968
Second Graduate Certification Program ....................... 286
SEFB - Special Ed Field Based .................................. 974
SENG - Safety Engineering ....................................... 975
Services for Students ........................................... 72
SOCI - Sociology .................................................. 976
Sociology - 5-Year Bachelor of Arts/Master of Public Service Administration .................. 497
Sociology - 5-Year Bachelor of Science/Master of Public Service Administration ............... 497
Sociology - BA ...................................................... 495
Sociology - BS ...................................................... 496
Sociology - Minor .................................................. 499
Sociology of Gender - Certificate .............................. 500
Sociology of Race and Ethnicity - Certificate ..................... 500
SOMS-Schl of Military Sciences .................................. 982
SPAN - Spanish .................................................. 982
Spanish - BA ........................................................ 451
Spanish - Minor .................................................... 453
Spatial Sciences - BS ............................................ 144
Spatial Sciences - Minor .......................................... 145
SPED - Special Education ....................................... 985
SPMT - Sport Management ....................................... 987
Sport Management - BS, Internship Track ..................... 274
Sport Management - BS, Non-internship Track ................ 275
Sport Management - Minor ....................................... 280
SPSC - Spatial Sciences .......................................... 989
STAT - Statistics .................................................. 990
Statistics - Minor .................................................. 568
STLC - Student Learning Center ................................ 993
Strategic Communication - Certificate .......................... 435
Student Learning Outcomes ..................................... 24
Supply Chain Management - BBA .............................. 224
Sustainable Architecture and Planning - Minor .............. 196

T
TCMG - Technology Management ............................... 994
Technology Management - BS ................................. 250
TEED - Teacher Education ....................................... 995
TEFB - Teacher Ed Field Based .................................. 995
Telecommunication Media Studies - BA ....................... 431
Telecommunication Media Studies - BS ....................... 432
Texas A&M Baylor College of Dentistry ....................... 241
Texas A&M University at Galveston ............................ 588
Texas A&M University at Qatar ................................. 590
Texas A&M University Undergraduate Catalog .................. 11
Texas Common Course Numbering System ..................... 1094
THAR - Theatre Arts ............................................. 996
Theatre Arts - BA .................................................. 476
Theatre Arts - Minor .............................................. 478
Tourism and Hospitality Management - Certificate .......... 179
Tourism Management - Minor ................................... 178
Trading, Risk and Investments - Certificate ................. 220
Transition Academic Programs ................................ 95
Tuition, Fees and Other Financial Information ................... 80
Turfgrass Science - BS ........................................... 183

U
UGST - Undergraduate Studies ................................... 999
University Academic Calendar ................................ 13
University Core Curriculum ..................................... 19
University Policies .................................................. 90
University Studies - BA, Journalism Concentration ........... 501
University Studies - BA, Race, Gender, Ethnicity Concentration .................. 501
University Studies - BS, Biomedical Sciences Concentration .................. 581
University Studies - BS, Business Concentration ............... 240
University Studies - BS, Child Professional Services Non-Certification Program ............ 256
University Studies - BS, Child Professional Services Non-Certification Program ............ 288
University Studies - BS, Dance Concentration ................ 276
University Studies - BS, Dance Concentration ................ 288
University Studies - BS, Environmental Business Concentration .................. 167
University Studies - BS, Environmental Business Concentration .................. 184
University Studies - BS, Geographic Information Science and Technology Concentration ........ 390
University Studies - BS, Geographic Information Science and Technology Concentration ........ 405
University Studies - BS, Geography Concentration ........... 390
University Studies - BS, Geography Concentration ........... 405
University Studies - BS, Global Arts, Planning, Design and Construction Concentration .... 204
University Studies - BS, Leadership Studies Concentration ........ 122
University Studies - BS, Leadership Studies Concentration ........ 184
University Studies - BS, Mathematics for Business Concentration .................. 568
University Studies - BS, Mathematics for Pre-Professionals Concentration .......... 569
University Studies - BS, Mathematics for Teaching Concentration ........... 570
University Studies - BS, Race, Gender, Ethnicity Concentration ........... 504
<table>
<thead>
<tr>
<th>Index</th>
<th>1113</th>
</tr>
</thead>
</table>

| University Studies - BS, Science for Secondary Teaching Concentration | 569 |
| University Studies - BS, Sport Conditioning Concentration | 288 |
| University Studies - BS, Sport Leadership Concentration | 288 |
| University Studies - BS, Sports Conditioning Concentration | 277 |
| University Studies - BS, Sports Leadership Concentration | 278 |
| University Studies Degrees | 96 |
| University Studies Programs | 184 |
| University Studies Programs | 204 |
| University Studies Programs | 240 |
| University Studies Programs | 287 |
| University Studies Programs | 404 |
| University Studies Programs | 500 |
| University Studies Programs | 568 |
| Urban and Regional Planning - BS | 202 |
| Urban and Regional Planning - Minor | 203 |
| URPN - Urban & Reg Planning | 999 |

**V**
- VIBS - Vet Integrative Biosci | 1001 |
- VIST - Visual Studies | 1006 |
- Visualization - BS | 206 |
- VLCS-Vet Large Animal Clin Sc | 1008 |
- VSCS-Vet Small Animal Clin Sc | 1009 |
- VTPB - Veterinary Pathobiology | 1010 |
- VTPP - Vet Physiology & Pharm | 1012 |

**W**
- Watershed - Certificate | 145 |
- WFSC-Wildlife & Fisheries Sci | 1016 |
- WGST - Women's &Gender Studies | 1021 |
- Wildlife and Fisheries Sciences - BS, Aquatic Ecology and Conservation Option | 185 |
- Wildlife and Fisheries Sciences - BS, Vertebrate Zoology Option | 186 |
- Wildlife and Fisheries Sciences - BS, Wildlife Ecology and Conservation Option | 187 |
- Wildlife and Fisheries Sciences - Minor | 189 |
- Women's and Gender Studies - BA | 414 |
- Women's Studies - Minor | 422 |

**Z**
- Zachry Department of Civil Engineering | 305 |
- ZOOL - Zoology | 1025 |
- Zoology - BS | 529 |