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 and Analysis (ESA) track is designed to attract students interested in applying GIST to physical geography. It applies geospatial technologies to the study of the Geosciences and assessing the Earth’s natural resources by providing students with a foundation in biogeography, climate, geomorphology, soil science, geology, ecosystem science, as well as a strong grounding in GIST.

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), are 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 explore causative influences.
- Military and intelligence community: numerous opportunities exist in military branches, and agencies such as the Central Intelligence Agency, National Security Agency, and other intelligence organizations.
- Commercial industries: business analytics and marketing, as spatial information can be used to target marketing campaigns, and suitable site assessment 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>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>Communication (<a href="http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#communication">http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#communication</a>)</td>
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<tr>
<td></td>
<td>GEG 203 &amp; GEG 213 and Planet Earth Lab</td>
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<td>MATH 141 Finite Mathematics</td>
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<td>Life and physical sciences 1</td>
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<tr>
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<td>BIOL 101 Botany</td>
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<td>BIOL 111 Introductory Biology I</td>
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<td></td>
<td>CHEM 101 &amp; CHEM 111 Fundamentals of Chemistry I and Fundamentals of Chemistry Laboratory I</td>
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<td>GEOL 101 Principles of Geology</td>
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<td>PHYS 201 College Physics</td>
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<td>ATMO 201 &amp; ATMO 202 and Weather and Climate Laboratory</td>
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<td>Semester Credit Hours</td>
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<td>Spring</td>
<td>GEG 201 Introduction to Human Geography</td>
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<td>MATH 142 Business Calculus</td>
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<td>POLS 206 American National Government</td>
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<tr>
<td></td>
<td>BIOL 107 Zoology</td>
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<td>BIOL 112 Introductory Biology II</td>
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<td>CHEM 102 &amp; CHEM 112 Fundamentals of Chemistry II and Fundamentals of Chemistry Laboratory II</td>
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<td>GEOL 106 Historical Geology</td>
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<td>PHYS 202 College Physics</td>
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<td>OCGN 251 &amp; OCGN 252 Oceanography and Oceanography Laboratory</td>
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<td>Semester Credit Hours</td>
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Second Year

<table>
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<th>Semester</th>
<th>Course Code</th>
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<tr>
<td>Fall</td>
<td>GEG 232 Cartography and Visualization</td>
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<tr>
<td></td>
<td>POLS 207 State and Local Government</td>
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<td></td>
<td>American history (<a href="http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#american-history">http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#american-history</a>)</td>
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### Creative arts
- [http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#creative-arts](http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#creative-arts)

### Social and behavioral sciences
- [http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#social-behavioral-sciences](http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#social-behavioral-sciences)

### Semester Credit Hours
- 15

### Spring
- Select one of the following:
  - GEOG 324: Global Climatic Regions
  - GEOG 331: Geomorphology
  - GEOG 335: Pattern and Process in Biogeography
  - GEOG 352/GEOL 352: GNSS in the Geosciences

### STAT 303: Statistical Methods
- 3

### American history
- [http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#american-history](http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#american-history)
- 3

### Language, philosophy and culture
- [http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#language-philosophy-culture](http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/#language-philosophy-culture)
- 3

### Semester Credit Hours
- 15

### Third Year

#### Fall
- 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 324: Global Climatic Regions
  - GEOG 331: Geomorphology
  - GEOG 335: Pattern and Process in Biogeography
  - GEOG 361: Remote Sensing in Geosciences
  - GEOG 390: Principles of Geographic Information Systems

### Semester Credit Hours
- 14

#### Spring
- ESSM 459 or GEOG 391: Programming for Spatial Data Applications or Geodatabases
- GEOG 312: Data Analysis in Geography
- GEOG 475: Advanced Topics in GIS (Geographic Information Systems)

### Track elective
- 2

### Directed elective
- 3

### Fall
- GEOG 477: Terrain Analysis and Mapping
- 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
- 3

### ESSM 351/RENR 405: Geographic Information Systems for Resource Management
- 3

### ESSM 360: Sedimentology and Stratigraphy
- 3

### ESSM 364: Hydrogeology
- 3

### ESSM 205: Natural Hazards
- 3

### ESSM 406: Pattern and Process in Biogeography
- 3

### ESSM 416: Fire Ecology and Natural Resource Management
- 3

### ESSM 440: Wetland Delineation
- 3

### ESSM 464: Spatial Project Management
- 3

### GEOL 104: Physical Geology
- 3

### GEOL 306: Sedimentology and Stratigraphy
- 3

### GEOL 410: Hydrogeology
- 3

### RENR 205: Fundamentals of Ecology
- 3

### RENR 470: Environmental Impact Assessment
- 3

### STAT 211: Principles of Statistics I
- 3

### STAT 212: Principles of Statistics II
- 3

### Fourth Year

#### Fall
- Select 6 hours from 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/RENR 405: Geographic Information Systems for Resource Management
  - ESSM 360: Sedimentology and Stratigraphy
  - ESSM 364: Hydrogeology
  - ESSM 406: Pattern and Process in Biogeography
  - 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

### Track elective
- 2

### Directed elective
- 3

### Semester Credit Hours
- 14

### Spring
- Select 6 hours from 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/RENR 405: Geographic Information Systems for Resource Management
  - ESSM 360: Sedimentology and Stratigraphy
  - ESSM 364: Hydrogeology
  - ESSM 406: Pattern and Process in Biogeography
  - ESSM 416: Fire Ecology and Natural Resource Management
  - ESSM 440: Wetland Delineation
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  - 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
<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>GEOG 435</td>
<td>Principles of Plant Geography</td>
</tr>
<tr>
<td>GEOG 440</td>
<td>History and Nature of Geography</td>
</tr>
<tr>
<td>GEOG 442</td>
<td>Past Climates</td>
</tr>
<tr>
<td>GEOS 442</td>
<td>Field Geography</td>
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<tr>
<td>GEOG 461</td>
<td>Digital Image Processing in the Geosciences</td>
</tr>
<tr>
<td>GEOG 467</td>
<td>Dynamic Modeling of Earth and Environmental Systems</td>
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<tr>
<td>GEOG 478</td>
<td>WebGIS</td>
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<tr>
<td>GEOS 410</td>
<td>Global Change</td>
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Semester Credit Hours 16

**Spring**

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<tr>
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<tbody>
<tr>
<td>GEOG 479</td>
<td>Principles of Geocomputation</td>
</tr>
<tr>
<td>GEOG 476</td>
<td>GIS Practicum</td>
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Select three of the following:

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</tr>
<tr>
<td>STAT 212</td>
<td>Principles of Statistics II</td>
</tr>
</tbody>
</table>

Semester Credit Hours 16

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.