AEROSPACE ENGINEERING - BS

Coursework in aerodynamics, materials and structures, propulsion, and dynamics and control of aircraft and spacecraft provide a strong fundamental basis for advanced study and specialization, while senior technical electives offer a concentration of study in fields of special interest. Design is emphasized particularly in senior design electives and a senior-level two-semester design sequence involving specific goals, objectives, and constraints, which integrates analysis and design tools and requires students working in teams to design, and in some cases build, test, and deploy an aerospace system, such as an aircraft, rotorcraft, flight simulator, morphing air or space structure, space suit, space habitat, or a mission to Mars. Application of modern engineering and computational tools is required and emphasized in most courses.

Program Requirements

The freshman year is identical for degrees in aerospace engineering, architectural engineering, civil engineering, computer engineering, computer science, electrical engineering, electronic systems engineering technology, environmental engineering, industrial distribution, industrial engineering, interdisciplinary engineering, manufacturing and mechanical engineering technology, mechanical engineering, multidisciplinary engineering technology, nuclear engineering, ocean engineering, and petroleum engineering (Note: not all programs listed are offered in Qatar). The freshman year is slightly different for chemical engineering, biomedical engineering and materials science and engineering degrees in that students take CHEM 119 or CHEM 107/CHEM 117 and CHEM 120. Students pursuing degrees in biological and agricultural engineering should refer to the specific curriculum for this major. 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.

First Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>CHEM 107</td>
<td>General Chemistry for Engineering Students</td>
<td>3</td>
<td>1,4</td>
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<tr>
<td></td>
<td>CHEM 117</td>
<td>General Chemistry for Engineering Students Laboratory</td>
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<td>1,4</td>
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<tr>
<td></td>
<td>ENGL 103 or ENGL 104</td>
<td>Introduction to Rhetoric and Composition</td>
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<td>1</td>
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<tr>
<td></td>
<td>ENGR 102</td>
<td>Engineering Lab I - Computation</td>
<td>2</td>
<td>1</td>
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<td></td>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
<td>4</td>
<td>1,2</td>
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<td></td>
<td>University Core Curriculum (<a href="http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/">http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/</a>)</td>
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<td>3</td>
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<td>Semester Credit Hours</td>
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<th>Course Title</th>
<th>Semester Credit Hours</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>Spring</td>
<td>ENGR 216/217</td>
<td>Experimental Physics and Engineering Lab II - Mechanics</td>
<td>2</td>
<td>1</td>
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<tr>
<td></td>
<td>MATH 152</td>
<td>Engineering Mathematics II</td>
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<td></td>
<td>PHYS 206</td>
<td>Newtonian Mechanics for Engineering and Science</td>
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<td>1</td>
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<td>Semester Credit Hours</td>
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Second Year

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<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>AERO 201</td>
<td>Introduction to Flight</td>
<td>3</td>
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<tr>
<td></td>
<td>AERO 211</td>
<td>Aerospace Engineering Mechanics</td>
<td>3</td>
<td>1</td>
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<tr>
<td></td>
<td>AERO 212</td>
<td>Introduction to Aerothermodynamics</td>
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<td>1</td>
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<tr>
<td></td>
<td>MATH 251 or MATH 253</td>
<td>Engineering Mathematics III</td>
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<tr>
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<td>PHYS 207</td>
<td>Electricity and Magnetism for Engineering and Science</td>
<td>3</td>
<td>1</td>
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<tr>
<td></td>
<td>PHYS 217/218</td>
<td>Experimental Physics and Engineering Lab III - Electricity and Magnetism</td>
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<td>AERO 214</td>
<td>Introduction to Aerospace Mechanics of Materials</td>
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<td>Semester Credit Hours</td>
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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 21 hours shown as University Core Curriculum electives, 3 must be from creative arts (see AREN curriculum for more information), 3 from social and behavioral sciences (see IDIS curriculum for more information), 3 from language, philosophy and culture (see CVEN, EVEN and PETE curriculum for more information), 6 from American history and 6 from government/political science. The required 3 hours of international and cultural diversity and 3 hours of cultural discourse may be met by courses satisfying the creative arts, social and behavioral sciences, language, philosophy and culture, and American history requirements if they are also on the approved list of international and cultural diversity (http://catalog.tamu.edu/undergraduate/general-information/degree-information/international-cultural-diversity-requirements/) courses and cultural discourse (http://catalog.tamu.edu/undergraduate/general-information/degree-information/cultural-discourse-requirements/) courses.
4 BMEN, CHEN and MSEN require 8 hours of fundamentals of chemistry which are satisfied with CHEM 119 or CHEM 107/CHEM 117 and CHEM 120; Students with an interest in BMEN, CHEN and MSEN can take CHEM 120 second semester freshman year. CHEM 120 will substitute for CHEM 107/CHEM 117.
5 For BS-PETE, allocate 3 hours to core communications course (ENGL 210, COMM 203, COMM 205, or COMM 243) and/or 3 hours to UCC elective. For BS-MEEN, allocate 3 hours to core communications course (ENGL 203, ENGL 210, or COMM 205) and/or 3 hours to UCC elective.
AER 222  Introduction to Aerospace Computation  
MATH 308  Differential Equations

Select one of the following:

COMM 203  Public Speaking
COMM 205  Communication for Technical Professions
COMM 243  Argumentation and Debate
ENGL 210  Technical and Professional Writing

High Impact Experience 6
AERO 299  Mid-Curriculum Professional Development

Semester Credit Hours  15

Fall
AERO 303  High Speed Aerodynamics  
AERO 304  Aerospace Structural Analysis I  
AERO 310  Aerospace Dynamics  
ECEN 215  Principles of Electrical Engineering

University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/)

Semester Credit Hours  18

Spring
AERO 306  Aerospace Structural Analysis II  
AERO 307  Aerospace Engineering Laboratory  
AERO 321  Dynamics of Aerospace Vehicles  
AERO 351  Aerothermodynamics and Propulsion  

University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/)

Semester Credit Hours  15

Fourth Year
Fall
AERO 401  Aerospace Design Principles  
AERO 413  Aerospace Materials Science  
AERO 423  Orbital Mechanics  

Select one of the following:

AERO 430  Numerical Simulation  
MATH 401  Advanced Engineering Mathematics  
MATH 412  Theory of Partial Differential Equations

Select one of the following:

AERO 405  Aerospace Structural Design  
AERO 417  Aerospace Propulsion  
AERO 426  Space System Design  
AERO 428  Electromagnetic Sensing for Space-Borne Imaging  
AERO 451  Human Spaceflight Operations  
AERO 472  Airfoil and Wing Design

Semester Credit Hours  15

Spring
AERO 402  Aerospace Systems Design  
AERO 422  Active Controls for Aerospace Vehicles  
AERO 452  Heat Transfer and Viscous Flows  

Select two of the following:

AERO 404  Mechanics of Advanced Aerospace Structures  
AERO 405  Aerospace Structural Design  
AERO 411  Applications of Fracture Mechanics to Aerospace Structures  
AERO 414  Human Performance in Aerospace Environments  
AERO 415  Computational Fluid Dynamics for Aerospace Applications  
AERO 417  Aerospace Propulsion  
AERO 419  Chemical Rocket Propulsion  
AERO 420  Aeroelasticity  
AERO 424  Spacecraft Attitude Dynamics and Control  
AERO 425  Flight Test Engineering  
AERO 426  Space System Design  
AERO 428  Electromagnetic Sensing for Space-Borne Imaging  
AERO 430  Numerical Simulation  
AERO 435  Aerothermochemistry  
AERO 440  Cockpit Systems and Displays  
AERO 445  Vehicle Management Systems  
AERO 451  Human Spaceflight Operations  
AERO 455  Helicopter Aerodynamics  
AERO 472  Airfoil and Wing Design  
AERO 489  Special Topics in...  
ECEN 421  Digital Control Systems  

University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/)

Semester Credit Hours  17

Total Semester Credit Hours  97

All students are required to complete a high-impact experience in order to graduate. The list of possible high-impact experiences is available in the AERO advising office.

A two-semester sequence is required.

Total Program Hours 128