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, petroleum engineering (Note: not all programs listed are offered in Qatar). 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, petroleum engineering (Note: not all programs listed are offered in Qatar). Students pursuing degrees in biological and agricultural engineering need to take

Qatar). The freshman year is slightly different for chemical engineering, petroleum engineering (Note: not all programs listed are offered in Qatar). 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, petroleum engineering (Note: not all programs listed are offered in Qatar). 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>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>CHEM 107</td>
<td>General Chemistry for Engineering Students</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CHEM 117</td>
<td>General Chemistry for Engineering Students</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>ENGL 103 or ENGL 104</td>
<td>Introduction to Rhetoric and Composition</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ENGR 102</td>
<td>Engineering Lab I - Computation</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MATH 151</td>
<td>Engineering Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>University Core Curriculum</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Semester Credit Hours</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>

Spring

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGR 216/1</td>
<td>Experimental Physics and Engineering Lab II - Mechanics</td>
<td>2</td>
</tr>
<tr>
<td>MATH 152</td>
<td>Engineering Mathematics II</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 206</td>
<td>Newtonian Mechanics for Engineering and Science</td>
<td>3</td>
</tr>
<tr>
<td>Semester Credit Hours</td>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>

Second Year

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>AERO 201</td>
<td>Introduction to Flight</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>AERO 211</td>
<td>Aerospace Engineering Mechanics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>AERO 212</td>
<td>Introduction to Aerothermodynamics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MATH 251 or MATH 253</td>
<td>Engineering Mathematics III or Engineering Mathematics III</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHYS 207</td>
<td>Electricity and Magnetism for Engineering and Science</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHYS 217/ENGR 217</td>
<td>Experimental Physics and Engineering Lab III - Electricity and Magnetism</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Semester Credit Hours</td>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>

Spring

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERO 214</td>
<td>Introduction to Aerospace Mechanics of Materials</td>
<td>3</td>
</tr>
</tbody>
</table>

University Core Curriculum

Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 120</td>
<td>Fundamentals of Chemistry II</td>
<td>3-4</td>
</tr>
<tr>
<td>Semester Credit Hours</td>
<td>15-16</td>
<td></td>
</tr>
<tr>
<td>Total Semester Credit Hours</td>
<td>31-32</td>
<td></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 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 107/117 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 107/117.
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.
AERO 222  Introduction to Aerospace Computation 1  3
AERO 301  Theoretical Aerodynamics 1  3
MATH 308  Differential Equations 1  3
Select one of the following: 1  3
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  0
AERO 299  Mid-Curriculum Professional Development

**Semester Credit Hours**  15

**Third Year**

**Fall**
AERO 303  High Speed Aerodynamics 1  3
AERO 304  Aerospace Structural Analysis I 1  3
AERO 310  Aerospace Dynamics 1  3
ECEN 215  Principles of Electrical Engineering 1  3
University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/) 3  6

**Semester Credit Hours**  18

**Spring**
AERO 306  Aerospace Structural Analysis II 1  3
AERO 307  Aerospace Engineering Laboratory 1  3
AERO 321  Dynamics of Aerospace Vehicles 1  3
AERO 351  Aerothermodynamics and Propulsion 1  3
University Core Curriculum (http://catalog.tamu.edu/undergraduate/general-information/university-core-curriculum/) 3  3

**Semester Credit Hours**  15

**Fourth Year**

**Fall**
AERO 401  Aerospace Design Principles 1,7  3
AERO 413  Aerospace Materials Science 1  3
AERO 423  Orbital Mechanics 1  3
Select one of the following: 1  3
AERO 430  Numerical Simulation
MATH 401  Advanced Engineering Mathematics
MATH 412  Theory of Partial Differential Equations
Select one of the following: 1  3
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 1,7  2
AERO 422  Active Controls for Aerospace Vehicles 1  3
AERO 452  Heat Transfer and Viscous Flows 1  3
Select two of the following: 1  6
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  Aerothermodynamics
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/) 3  3

**Semester Credit Hours**  17

**Total Semester Credit Hours**  97

6 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.
7 A two-semester sequence is required.

**Total Program Hours 128**