# 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 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</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td>CHEM 107 General Chemistry for Engineering Students</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CHEM 117 General Chemistry for Engineering Students</td>
<td>1</td>
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<tr>
<td></td>
<td>ENGL 103 or ENGR 104 Introduction to Rhetoric and Composition</td>
<td>1</td>
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<tr>
<td></td>
<td>ENGR 102 Engineering Lab I - Computation</td>
<td>2</td>
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<tr>
<td></td>
<td>MATH 151 Engineering Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>University Core Curriculum</td>
<td>3</td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td>ENGR 216/PHYS 216 Experimental Physics and Engineering Lab II - Mechanics</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MATH 152 Engineering Mathematics II</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>PHYS 206 Newtonian Mechanics for Engineering and Science</td>
<td>3</td>
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</tbody>
</table>

### Second Year

<table>
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<th>Semester</th>
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<tbody>
<tr>
<td><strong>Fall</strong></td>
<td>AERO 201 Introduction to Flight</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>AERO 211 Aerospace Engineering Mechanics</td>
<td>3</td>
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<tr>
<td></td>
<td>AERO 212 Introduction to Aerothermodynamics</td>
<td>3</td>
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<tr>
<td></td>
<td>MATH 251 or MATH 253 Engineering Mathematics III</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHYS 207 Electricity and Magnetism for Engineering and Science</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>PHYS 217/ENGR 217 Experimental Physics and Engineering Lab III - Electricity and Magnetism</td>
<td>2</td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td>AERO 214 Introduction to Aerospace Mechanics of Materials</td>
<td>3</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/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.
5. For BS-PETE, allocate 3 hours to core communications course (ENG 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 (ENG 203, ENGL 210, or COMM 205) and/or 3 hours to UCC elective.
AER 222 Introduction to Aerospace Computation \(^1\) 3
AER 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
AER 303 High Speed Aerodynamics \(^1\) 3
AER 304 Aerospace Structural Analysis I \(^1\) 3
AER 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
AER 306 Aerospace Structural Analysis II \(^1\) 3
AER 307 Aerospace Engineering Laboratory \(^1\) 3
AER 321 Dynamics of Aerospace Vehicles \(^1\) 3
AER 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
AER 401 Aerospace Design Principles \(^1,7\) 3
AER 413 Aerospace Materials Science \(^1\) 3
AER 423 Orbital Mechanics \(^1\) 3
Select one of the following: \(^1\) 3
AER 430 Numerical Simulation
MATH 401 Advanced Engineering Mathematics
MATH 412 Theory of Partial Differential Equations
Select one of the following: \(^1\) 3
AER 405 Aerospace Structural Design
AER 417 Aerospace Propulsion
AER 419 Chemical Rocket Propulsion
AER 426 Space System Design
AER 428 Electromagnetic Sensing for Space-Borne Imaging
AER 451 Human Spaceflight Operations
AER 472 Airfoil and Wing Design

Semester Credit Hours 15

Spring
AER 402 Aerospace Systems Design \(^1,7\) 2
AER 422 Active Controls for Aerospace Vehicles \(^1\) 3
AER 452 Heat Transfer and Viscous Flows \(^1\) 3
Select two of the following: \(^1\) 6
AER 404 Mechanics of Advanced Aerospace Structures
AER 405 Aerospace Structural Design
AER 411 Applications of Fracture Mechanics to Aerospace Structures
AER 414 Human Performance in Aerospace Environments
AER 415 Computational Fluid Dynamics for Aerospace Applications
AER 417 Aerospace Propulsion
AER 419 Chemical Rocket Propulsion
AER 420 Aeroelasticity
AER 424 Spacecraft Attitude Dynamics and Control
AER 425 Flight Test Engineering
AER 426 Space System Design
AER 428 Electromagnetic Sensing for Space-Borne Imaging
AER 430 Numerical Simulation
AER 435 Aerothermochemistry
AER 440 Cockpit Systems and Displays
AER 445 Vehicle Management Systems
AER 451 Human Spaceflight Operations
AER 455 Helicopter Aerodynamics
AER 472 Airfoil and Wing Design
AER 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

Total Program Hours 128

\(^6\) 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.