AEROSPACE ENGINEERING, B.S.E.

The BSE Aerospace Engineering program is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org, under the General Criteria and the Aerospace and Similarly Named Engineering Programs Criteria.

Learning Outcomes

The program is intended to train students in the field of aerospace engineering such that they are well prepared for a career as a multidisciplinary engineer in the aerospace industry or any other industry that requires the abilities specified by ABET for engineers at the BS level:

1. Students shall have an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. Students shall have an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. Students shall have an ability to communicate effectively with a range of audiences.
4. Students shall have an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. Students shall have an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. Students shall have an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. Students shall have an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Academic Standards

Program GPA

Program GPA requirement policies are described in the Molinaroli College of Engineering and Computing section of this bulletin. For the purpose of these policies, the following courses are used to determine the Program GPA for the Aerospace Engineering B.S.E. program: all Lower Division Engineering courses, all Aerospace Engineering Major courses, and all Aerospace Engineering Elective courses.

Admissions

Entrance Requirements

Admission requirements and processes for freshman, transfer students, and former students seeking readmission are managed by the Office of Undergraduate Admissions (http://sc.edu/about/offices_and_divisions/undergraduate_admissions/).

Transfer applicants from regionally accredited colleges and universities must have a cumulative 2.75 GPA on a 4.00 scale to enter the College of Engineering and Computing. In addition, transfer applicants for the Aerospace Engineering, Biomedical Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, or Mechanical Engineering majors must also have completed a four semester-hour calculus course equivalent to MATH 141 with a grade of "C" or better.

Current University of South Carolina students who wish to enter the College of Engineering and Computing, and former students seeking readmission, must have an institutional GPA of 2.50 or better on at least 15 hours earned at USC. In addition, such applicants for the Aerospace Engineering, Biomedical Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, or Mechanical Engineering majors must also have completed a four semester-hour calculus course equivalent to MATH 141 with a grade of "C" or better.

Degree Requirements (125-137 hours)

See College of Engineering and Computing (https://academicbulletins.sc.edu/undergraduate/engineering-computing/) for progression requirements and special academic opportunities.

Program of Study

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Carolina Core</td>
<td>34-46</td>
</tr>
<tr>
<td>2. College Requirements</td>
<td>0</td>
</tr>
<tr>
<td>3. Program Requirements</td>
<td>46</td>
</tr>
<tr>
<td>4. Major Requirements</td>
<td>45</td>
</tr>
</tbody>
</table>

Founding Documents Requirement

All undergraduate students must take a 3-credit course or its equivalent with a passing grade in the subject areas of History, Political Science, or African American Studies that covers the founding documents including the United State Constitution, the Declaration of Independence, the Emancipation Proclamation and one or more documents that are foundational to the African American Freedom struggle, and a minimum of five essays from the Federalist papers. This course may count as a requirement in any part of the program of study including the Carolina Core, the major, minor or cognate, or as a general elective. Courses that meet this requirement are listed here (https://academicbulletins.sc.edu/undergraduate/founding-document-courses/).

1. Carolina Core Requirements (34-46 hours)

CMW – Effective, Engaged, and Persuasive Communication: Written (6 hours)-
- ENGL 101 - must be passed with a grade of C or higher
- ENGL 102

ARP – Analytical Reasoning and Problem Solving (8 hours)

must be passed with a grade of C or higher
- MATH 141
- MATH 142

SCI – Scientific Literacy (8 hours)

must be passed with a grade of C or higher
- CHEM 111 & CHEM 111L
- PHYS 211 & PHYS 211L
GFL – Global Citizenship and Multicultural Understanding: Foreign Language (0-6 hours)
Score two or better on foreign language placement test; or complete the 109 and 110 courses in FREN, GERM, LATN or SPAN; or complete the 121 course in another foreign language.
• CC-GFL courses (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

GHS – Global Citizenship and Multicultural Understanding: Historical Thinking (3 hours)
• any CC-GHS course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

GSS – Global Citizenship and Multicultural Understanding: Social Sciences (3 hours)
• any CC-GSS course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

AIU – Aesthetic and Interpretive Understanding (3 hours)
• any CC-AIU course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

CMS – Effective, Engaged, and Persuasive Communication: Spoken Component 1 (0-3 hours)
• PHIL 325 (CMS/VSR overlay)
• any overlay or stand-alone CC-CMS course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

INF – Information Literacy 1 (0-3 hours)
• any overlay or stand-alone CC-INF course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

VSR – Values, Ethics, and Social Responsibility 1 (0-3 hours)
• PHIL 325 (CMS/VSR overlay)
• any overlay or stand-alone CC-VSR course (https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/)

1 Carolina Core Stand Alone or Overlay Eligible Requirements — Overlay-approved courses offer students the option of meeting two Carolina Core components in a single course. A maximum of two overlays is allowed. The total Carolina Core credit hours for this program must add up to a minimum of 34 hours.

2. College Requirements (0 hours)
No college-required courses for this program.

3. Program Requirements (46 hours)
Supporting Courses (46 hours)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 112</td>
<td>General Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 112L</td>
<td>General Chemistry II Lab</td>
<td>1</td>
</tr>
<tr>
<td>ELCT 220</td>
<td>Electrical Engineering for Non-Majors</td>
<td>3</td>
</tr>
</tbody>
</table>

Lower Division Engineering
AESP 101  Introduction into Aerospace Engineering 3
or ENCP 101  Introduction to Engineering 3
EMCH 111  Introduction to Computer-Aided Design 3
or ENCP 102  Introduction to Computer-Aided Design 3
EMCH 200  Statics (must be passed with a grade of C or higher) 3
or ENCP 200  Statics 3
EMCH 201  Introduction to Applied Numerical Methods 3
or ENCP 201  Introduction to Applied Numerical Methods 3
EMCH 260  Solid Mechanics 3
or ENCP 260  Introduction to the Mechanics of Solids 3
EMCH 290  Thermodynamics 3
or ENCP 290  Thermodynamic Fundamentals 3

Aerospace Engineering Electives
Select nine hour from the following: 9
AESP 460  Special Problems: Aerospace Engineering
AESP 543  Aerospace Propulsion
ELCT 221  Circuits
ELCT 222  Signals and Systems
ELCT 321  Digital Signal Processing
ELCT 331  Control Systems
ELCT 361  Electromagnetics
ELCT 371  Electronics
ELCT 531  Digital Control Systems
ELCT 562  Wireless Communications
ELCT 564  RF Circuit Design for Wireless Communications
ELCT 572  Power Electronics
EMCH 332  Kinematics
EMCH 354  Heat Transfer
EMCH 377  Manufacturing
EMCH 516  Control Theory in Mechanical Engineering
EMCH 530  Introduction to Engineering Optimization
EMCH 532  Intermediate Dynamics
EMCH 535  Robotics in Mechanical Engineering
EMCH 544  Compressible Fluid Flow
EMCH 554  Intermediate Heat Transfer
EMCH 560  Intermediate Fluid Mechanics
EMCH 578  Introduction to Aerodynamics
EMCH 585  Introduction to Composite Materials
EMCH 592  Introduction to Combustion

Total Credit Hours 46

4. Major Requirements (45 hours)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AESP 265</td>
<td>Aerodynamics I Incompressible Flow</td>
<td>3</td>
</tr>
<tr>
<td>AESP 314</td>
<td>Energy Power and Propulsion</td>
<td>3</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Credits</td>
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<tr>
<td>AESP 350</td>
<td>Aerospace Systems</td>
<td>3</td>
</tr>
<tr>
<td>AESP 361</td>
<td>Aerospace Laboratory I</td>
<td>3</td>
</tr>
<tr>
<td>AESP 362</td>
<td>Aerospace Laboratory II</td>
<td>3</td>
</tr>
<tr>
<td>AESP 365</td>
<td>Aerodynamics II: Compressible Flow</td>
<td>3</td>
</tr>
<tr>
<td>AESP 415</td>
<td>Aircraft Design Part I Basics</td>
<td>3</td>
</tr>
<tr>
<td>AESP 420</td>
<td>Flight and Orbital Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>AESP 428</td>
<td>Design I</td>
<td>3</td>
</tr>
<tr>
<td>AESP 466</td>
<td>Flight Dynamics and Control</td>
<td>3</td>
</tr>
<tr>
<td>EMCH 308</td>
<td>Introduction to Finite Element Stress Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EMCH 310</td>
<td>Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>or ENCP 210</td>
<td>Dynamics</td>
<td></td>
</tr>
<tr>
<td>EMCH 330</td>
<td>Mechanical Vibrations</td>
<td>3</td>
</tr>
<tr>
<td>or ENCP 330</td>
<td>Introduction to Vibrations</td>
<td></td>
</tr>
<tr>
<td>EMCH 371</td>
<td>Materials</td>
<td>3</td>
</tr>
<tr>
<td>EMCH 577</td>
<td>Aerospace Structures I</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Credit Hours** 45

**Major Map**

A major map is a layout of required courses in a given program of study, including critical courses and suggested course sequences to ensure a clear path to graduation.

Major maps are only a suggested or recommended sequence of courses required in a program of study. Please contact your academic advisor for assistance in the application of specific coursework to a program of study and course selection and planning for upcoming semesters.

Aerospace Engineering, B.S.E.