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>
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</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 States 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>

or ELCT 221 Circuits
MATH 241 Vector Calculus 3
MATH 242 Elementary Differential Equations 3
MATH 344 Applied Linear Algebra 3
STAT 509 Statistics for Engineers 3

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:

AESP 460 Special Problems: Aerospace Engineering 9
AESP 543 Aerospace Propulsion 3
ELCT 221 Circuits 3
ELCT 222 Signals and Systems 3
ELCT 321 Digital Signal Processing 3
ELCT 331 Control Systems 3
ELCT 361 Electromagnetics 3
ELCT 371 Electronics 3
ELCT 531 Digital Control Systems 3
ELCT 562 Wireless Communications 3
ELCT 564 RF Circuit Design for Wireless Communications 3
ELCT 572 Power Electronics 3
EMCH 332 Kinematics 3
EMCH 354 Heat Transfer 3
EMCH 377 Manufacturing 3
EMCH 516 Control Theory in Mechanical Engineering 3
EMCH 530 Introduction to Engineering Optimization 3
EMCH 532 Intermediate Dynamics 3
EMCH 535 Robotics in Mechanical Engineering 3
EMCH 544 Compressible Fluid Flow 3
EMCH 554 Intermediate Heat Transfer 3
EMCH 560 Intermediate Fluid Mechanics 3
EMCH 578 Introduction to Aerodynamics 3
EMCH 585 Introduction to Composite Materials 3
EMCH 592 Introduction to Combustion 3

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>
<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.*