# AEROSPACE ENGINEERING, B.S.E.

## Program Educational Objectives

Within a few years of graduation, our graduates are expected to achieve the following milestones:

- Advance professionally in the aerospace industry, automotive industry, technical consultancy or in any other chosen career field
- Earn advanced degrees in aerospace engineering, (or a related technical discipline such as automotive engineering), business or law
- Attain leadership positions in today’s rapidly changing, increasingly technological, global society.
- Be agents of innovation and function effectively as responsible members of professional teams.

## 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:

- Students shall have an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- 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.
- Students shall have an ability to communicate effectively with a range of audiences.
- 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.
- 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.
- Students shall have an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- 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 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 Track Electives 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 UofSC. 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.

The last 25% of a student’s degree must be completed in residence at the University, and at least half of the hours in the student’s major courses and in the student’s minor courses (if applicable) must be taken at the University.

## Degree Requirements (126-138 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>
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</thead>
<tbody>
<tr>
<td>1. Carolina Core</td>
<td>34-46</td>
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<tr>
<td>2. College Requirements</td>
<td>0</td>
</tr>
<tr>
<td>3. Program Requirements</td>
<td>53</td>
</tr>
<tr>
<td>4. Major Requirements</td>
<td>39</td>
</tr>
</tbody>
</table>

### 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
2. College Requirements (0 hours)

No college-required courses for this program.

3. Program Requirements (53 hours)

Supporting Courses (53 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>MATH 241</td>
<td>Vector Calculus</td>
<td>3</td>
</tr>
<tr>
<td>MATH 242</td>
<td>Elementary Differential Equations</td>
<td>3</td>
</tr>
<tr>
<td>MATH 344</td>
<td>Applied Linear Algebra</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 212</td>
<td>Essentials of Physics II</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 212L</td>
<td>Essentials of Physics II Lab</td>
<td>1</td>
</tr>
<tr>
<td>STAT 509</td>
<td>Statistics for Engineers</td>
<td>3</td>
</tr>
</tbody>
</table>

Lower Division Engineering

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AESP 101</td>
<td>Introduction into Aerospace Engineering</td>
<td>3</td>
</tr>
<tr>
<td>or ENCP 101</td>
<td>Introduction to Engineering I</td>
<td></td>
</tr>
<tr>
<td>EMCH 111</td>
<td>Introduction to Computer-Aided Design</td>
<td>3</td>
</tr>
<tr>
<td>or ENCP 102</td>
<td>Introduction to Engineering II</td>
<td></td>
</tr>
<tr>
<td>EMCH 200</td>
<td>Statics (must be passed with a grade of C or higher)</td>
<td>3</td>
</tr>
<tr>
<td>EMCH 201</td>
<td>Introduction to Applied Numerical Methods</td>
<td>3</td>
</tr>
<tr>
<td>or ENCP 201</td>
<td>Introduction to Applied Numerical Methods</td>
<td></td>
</tr>
<tr>
<td>EMCH 260</td>
<td>Solid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>or ENCP 260</td>
<td>Introduction to the Mechanics of Solids</td>
<td></td>
</tr>
<tr>
<td>EMCH 290</td>
<td>Thermodynamics</td>
<td>3</td>
</tr>
<tr>
<td>or ENCP 290</td>
<td>Thermodynamic Fundamentals</td>
<td></td>
</tr>
</tbody>
</table>

Track Electives

Select one of the following tracks: 15

Aeromechanical Systems:
- AESP 415 Aircraft Design Part I Basics
- EMCH 585 Introduction to Composite Materials
- EMCH 308 Introduction to Finite Element Stress Analysis

Select two of the following:
- EMCH 332 Kinematics
- EMCH 354 Heat Transfer
- EMCH 535 Robotics in Mechanical Engineering
- EMCH 544 Compressible Fluid Flow
- EMCH 530 Introduction to Engineering Optimization

Integrated Information Technology:
- ITEC 233 Introduction to Computer Hardware and Software
- ITEC 245 Introduction to Networking

Select two of the following:
- ITEC 444 Introduction to Human Computer Interaction
- ITEC 445 Advanced Networking
- ITEC 493 Information Technology Security for Managers

Select one of the following:
- ITEC 370 Database Systems in Information Technology
  or ITEC 447 Management of Information Technology

Power Electronics Systems:
- ELCT 221 Circuits
- ELCT 222 Signals and Systems
- ELCT 371 Electronics
- ELCT 331 Control Systems

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.
ELCT 572  Power Electronics

Control Systems:
ELCT 221  Circuits
ELCT 222  Signals and Systems
ELCT 371  Electronics
ELCT 331  Control Systems
ELCT 531  Digital Control Systems

Communication Systems:
ELCT 221  Circuits
ELCT 222  Signals and Systems
Select three of the following:
ELCT 321  Digital Signal Processing
ELCT 361  Electromagnetics
ELCT 562  Wireless Communications
ELCT 564  RF Circuit Design for Wireless Communications

Total Credit Hours 53

4. Major Requirements (39 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>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 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 310</td>
<td>Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>or ENCP 210</td>
<td>Dynamics</td>
<td>3</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 377</td>
<td>Manufacturing</td>
<td>3</td>
</tr>
<tr>
<td>EMCH 577</td>
<td>Aerospace Structures I</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credit Hours 39

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.