MECHANICAL ENGINEERING, B.S.E.

Learning Outcomes
1. LO 1 - Complex Problems
   An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. LO 2 - Design
   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. LO 3 - Communication
   An ability to communicate effectively with a range of audiences
4. LO 4 - Judgement
   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. LO 5 - Teams
   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. LO 6 - Experiments
   An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. LO 7 - Knowledge
   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 Mechanical Engineering B.S.E. program: All Lower Division Engineering courses, all Mechanical Engineering Major courses, and all courses used to satisfy a Mechanical Engineering Elective.

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.

Degree Requirements (125 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>48</td>
</tr>
<tr>
<td>4. Major Requirements</td>
<td>43</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 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)
Select from the following:
• 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)
Select from the following:
• ENGL 102 (CMW/INF overlay)
• 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)
Select from the following:
• 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 (48 hours)
Supporting Courses (42 hours)
Course Title Credits
Foundational Courses
CSCE 206 Scientific Applications Programming 3
MATH 241 Vector Calculus 3
MATH 242 Elementary Differential Equations 3
Select Math/Science Electives 1 6
Any BIOL 110 or BIOL 301 and above, CHEM 112 or higher, MATH 300 or higher, PHYS 212 or higher, STAT 506 or higher course.

Lower Division Engineering
EMCH 101 Introduction to Mechanical Engineering 3
or ENCP 101 Introduction to Engineering I
EMCH 111 Introduction to Computer-Aided Design 3
or ENCP 102 Introduction to Engineering II
EMCH 200 Statics (must be passed with a grade of C or higher) 3
or ENCP 200 Statics
EMCH 201 Introduction to Applied Numerical Methods 3
or ENCP 201 Introduction to Applied Numerical Methods
EMCH 260 Solid Mechanics 3
or ENCP 260 Introduction to the Mechanics of Solids
EMCH 290 Thermodynamics 3
or ENCP 290 Thermodynamic Fundamentals
ELCT 220 Electrical Engineering for Non-Majors 3
or ELCT 221 Circuits

Mechanical Engineering Electives
Select six hours of the following: 6
EMCH 308 Introduction to Finite Element Stress Analysis
EMCH 441 Automotive System Fundamentals
EMCH 460 Special Problems
EMCH 497 Design of Thermal Systems
Any EMCH course numbered 500 or higher

Total Credit Hours 42

1 Any BIOL 110 or BIOL 301 and above, CHEM 112 or higher, MATH 300 or higher, PHYS 212 or higher, STAT 506 or higher course.

Elective (6 hours)
Any course taken at the University or transferred in as a University course that does not essentially duplicate a course otherwise applied to the degree. A list of such courses that cannot be used as a free elective is maintained in the department office. Courses that cannot be used includes:

Course Title Credits
ENCP 101 Introduction to Engineering I 3
ENCP 102 Introduction to Engineering II 3
ENCP 200 Statics 3
ENCP 201 Introduction to Applied Numerical Methods 3
ENCP 210 Dynamics 3
ENCP 260 Introduction to the Mechanics of Solids 3
ENCP 290 Thermodynamic Fundamentals 3
ENCP 330  Introduction to Vibrations  3  
ENCP 360  Fluid Mechanics  3  
ENCP 491  Capstone Design Project I  3  
ENCP 492  Capstone Design Project II  3  
ECHE 101  Introduction to Chemical Engineering  2  
ECHE 310  Introductory Chemical Engineering Thermodynamics  3  
ECHE 320  Chemical Engineering Fluid Mechanics  3  
ECHE 321  Heat-Flow Analysis  3  
ECIV 101  Introduction to Civil Engineering  3  
ECIV 111  Introduction to Engineering Graphics and Visualization  3  
ECIV 200  Statics  3  
ECIV 201  Computational Methods for Civil Engineering  3  
ECIV 210  Dynamics  3  
ECIV 220  Mechanics of Solids  3  
ECIV 360  Fluid Mechanics  3  
BMEN 101  Introduction to Biomedical Engineering  1  
ELCT 101  Electrical and Electronics Engineering  1

4. Major Requirements (43 hours)  

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<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 332</td>
<td>Kinematics</td>
<td>3</td>
</tr>
<tr>
<td>EMCH 354</td>
<td>Heat Transfer</td>
<td>3</td>
</tr>
<tr>
<td>EMCH 360</td>
<td>Fluid Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>or ENCP 360</td>
<td>Fluid Mechanics</td>
<td></td>
</tr>
<tr>
<td>EMCH 361</td>
<td>Laboratory I</td>
<td>3</td>
</tr>
<tr>
<td>EMCH 362</td>
<td>Laboratory II</td>
<td>3</td>
</tr>
<tr>
<td>EMCH 367</td>
<td>Controls</td>
<td>3</td>
</tr>
<tr>
<td>EMCH 368</td>
<td>Mechatronics</td>
<td>4</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 380</td>
<td>Project Management</td>
<td>3</td>
</tr>
<tr>
<td>EMCH 427</td>
<td>Design I</td>
<td>3</td>
</tr>
<tr>
<td>EMCH 428</td>
<td>Design II</td>
<td>3</td>
</tr>
<tr>
<td><strong>Mechanical Design elective:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMCH 327</td>
<td>Machine Design</td>
<td>3</td>
</tr>
<tr>
<td>or EMCH 394</td>
<td>Applied Thermodynamics</td>
<td></td>
</tr>
</tbody>
</table>

Total Credit Hours  43

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.