

# MECHANICAL ENGINEERING, B.S.E.

## Learning Outcomes

### LO 1 - Complex Problems

an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

### 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

### LO 3 - Communication

an ability to communicate effectively with a range of audiences

### 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

### 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

### LO 6 - Experiments

an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

### 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/](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 (125 hours)

See College of Engineering and Computing (<https://academicbulletins.sc.edu/archives/2020-2021/undergraduate/engineering-computing/>) for progression requirements and special academic opportunities.

### Program of Study

Requirements	Credit Hours
1. Carolina Core	34-46
2. College Requirements	0
3. Program Requirements	48
4. Major Requirements	43

## 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/archives/2020-2021/undergraduate/carolina-core-courses/>)

### GHS – Global Citizenship and Multicultural Understanding: Historical Thinking (3 hours)

- any CC-GHS course (<https://academicbulletins.sc.edu/archives/2020-2021/undergraduate/carolina-core-courses/>)

### GSS – Global Citizenship and Multicultural Understanding: Social Sciences (3 hours)

- any CC-GSS course (<https://academicbulletins.sc.edu/archives/2020-2021/undergraduate/carolina-core-courses/>)

### AIU – Aesthetic and Interpretive Understanding (3 hours)

- any CC-AIU course (<https://academicbulletins.sc.edu/archives/2020-2021/undergraduate/carolina-core-courses/>)

### CMS – Effective, Engaged, and Persuasive Communication: Spoken Component <sup>1</sup> (0-3 hours)

Select from the following:

- PHIL 325 (CMS/VSR overlay)
- any overlay or stand-alone CC-CMS course (<https://academicbulletins.sc.edu/archives/2020-2021/undergraduate/carolina-core-courses/>)

### INF – Information Literacy <sup>1</sup> (0-3 hours)

Select from the following:

- ENGL 102 (CMW/INF overlay)
- any overlay or stand-alone CC-INF course (<https://academicbulletins.sc.edu/archives/2020-2021/undergraduate/carolina-core-courses/>)

### VSR – Values, Ethics, and Social Responsibility <sup>1</sup> (0-3 hours)

Select from the following:

- PHIL 325 (CMS/VSR overlay)
- any overlay or stand-alone CC-VSR course (<https://academicbulletins.sc.edu/archives/2020-2021/undergraduate/carolina-core-courses/>)

#### <sup>1</sup> 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
<b>Foundational Courses</b>		
CSCE 206	Scientific Applications Programming	3
MATH 241	Vector Calculus	3
MATH 242	Elementary Differential Equations	3
<b>Select Math/Science Elective <sup>1</sup></b>		<b>6</b>
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.		
<b>Lower Division Engineering</b>		
EMCH 101 or ENCP 101	Introduction to Mechanical Engineering Introduction to Engineering I	3
EMCH 111 or ENCP 102	Introduction to Computer-Aided Design Introduction to Engineering II	3
EMCH 200 or ENCP 200	Statics (must be passed with a grade of C or higher) Statics	3
EMCH 201 or ENCP 201	Introduction to Applied Numerical Methods Introduction to Applied Numerical Methods	3
EMCH 260 or ENCP 260	Solid Mechanics Introduction to the Mechanics of Solids	3
EMCH 290 or ENCP 290	Thermodynamics Thermodynamic Fundamentals	3
ELCT 220 or ELCT 221	Electrical Engineering for Non-Majors Circuits	3
<b>Mechanical Engineering Electives</b>		
Select six hours of the following:		<b>6</b>
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		
<b>Total Credit Hours</b>		<b>42</b>

<sup>1</sup> 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	<b>Mechanical Engineering, B.S.E.</b>
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	2	
BMEN 211	Computational Tools for Modeling Biomedical Systems	3	
BMEN 260	Introduction to Biomechanics	3	
ELCT 101	Electrical and Electronics Engineering	3	

## 4. Major Requirements (43 hours)

Course	Title	Credits
EMCH 310	Dynamics	3
or ENCP 210	Dynamics	
EMCH 332	Kinematics	3
EMCH 354	Heat Transfer	3
EMCH 360	Fluid Mechanics	3
or ENCP 360	Fluid Mechanics	
EMCH 361	Mechanical Engineering Laboratory I	3
EMCH 362	Mechanical Engineering Laboratory II	3
EMCH 367	Controls	3
EMCH 368	Mechatronics	4
EMCH 371	Materials	3
EMCH 377	Manufacturing	3
EMCH 380	Project Management for Engineers	3
EMCH 427	Mechanical Design I	3
EMCH 428	Design II	3
<b>Mechanical Design elective:</b>		
EMCH 327	Machine Design	3
or EMCH 394	Applied Thermodynamics	
<b>Total Credit Hours</b>		<b>43</b>

## 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.