

# CIVIL ENGINEERING, B.S.E.

## Learning Outcomes

- Graduates of the program will have an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- Graduates of the program will 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
- Graduates of the program will have an ability to communicate effectively with a range of audiences
- Graduates of the program will 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
- Graduates of the program will 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
- Graduates of the program will have an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- Graduates of the program will have an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

## Academic Standards

### Entrance Requirements

See College of Engineering and Computing for progression requirements, and special academic opportunities.

### 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 Civil Engineering B.S.E. program: all Civil Engineering Lower Division courses, all Civil Engineering Major courses and all courses used to satisfy an ECIV Laboratory Elective, ECIV Distribution Elective, and ECIV Elective.

### Professional Development Requirement

Communications and Ethics: This requirement is satisfied by completing one or more program-accepted Carolina Core courses for CMS and VSR.

## 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.

## Communications and Ethics

This requirement is satisfied by completing one or more program-accepted Carolina Core courses for CMS and VSR.

## Degree Requirements (124-142 hours)

See College of Engineering and Computing (<https://academicbulletins.sc.edu/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	65-71
4. Major Requirements	25

### 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
- ENGL 102

### ARP – Analytical Reasoning and Problem Solving (8 hours)

- MATH 141
- MATH 142

### SCI – Scientific Literacy (8 hours)

- 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 <sup>1</sup> (0-3 hours)

Select from the following:

- PHIL 325 (CMS/VSR overlay)
- SPCH 140
- any overlay or stand-alone CC-CMS course (<https://academicbulletins.sc.edu/undergraduate/carolina-core-courses/>)

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

Select from the following:

- PHIL 325 (CMS/VSR overlay)
- PHIL 322
- any overlay or stand-alone CC-VSR course (<https://academicbulletins.sc.edu/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 (65-71 hours)

### Supporting Courses (65-71 hours)

Course	Title	Credits
<b>Foundational Required Courses</b>		
MATH 242	Elementary Differential Equations	3
STAT 509	Statistics for Engineers	3
or STAT 511	Probability	
<b>Foundational Math Elective</b> <b>3</b>		
Select one of the following:		
MATH 241	Vector Calculus	
MATH 300	Transition to Advanced Mathematics	
MATH 344	Applied Linear Algebra	
<b>Foundational Math/Science Elective</b> <b>3-4</b>		
Select one of the following:		
CHEM 112 & 112L	General Chemistry II and General Chemistry II Lab	
PHYS 212 & 212L	Essentials of Physics II and Essentials of Physics II Lab	
MATH 241	Vector Calculus	
MATH 300	Transition to Advanced Mathematics	
MATH 344	Applied Linear Algebra	
<b>Lower Division Engineering</b>		
ECIV 101	Introduction to Civil Engineering	3
or ENCP 101	Introduction to Engineering I	
ECIV 111	Introduction to Engineering Graphics and Visualization	3
or ENCP 102	Introduction to Engineering II	
ECIV 200	Statics	3
or ENCP 200	Statics	
ECIV 201	Computational Methods for Civil Engineering	3
or ENCP 201	Introduction to Applied Numerical Methods	
ECIV 220	Mechanics of Solids	3
or ENCP 260	Introduction to the Mechanics of Solids	
ECIV 360	Fluid Mechanics	3
or ENCP 360	Fluid Mechanics	
<b>ECIV Laboratory Courses</b>		
Select two of the following: <b>2</b>		
ECIV 303L	Civil Engineering Materials Laboratory	
ECIV 330L	Geotechnical Laboratory	
ECIV 340L	Transportation Engineering Laboratory	
ECIV 350L	Introduction to Environmental Engineering Laboratory	
ECIV 362L	Introduction to Water Resources Engineering Laboratory	
<b>ECIV Distribution Courses</b>		
Select one course from four of the following five areas: <b>12</b>		
Environmental Engineering		
ECIV 551	Elements of Water and Wastewater Treatment	
ECIV 555	Principles of Municipal Solid Waste Engineering	
ECIV 556	Air Pollution Control Engineering	
ECIV 557	Sustainable Construction for Engineers	
ECIV 558	Environmental Engineering Process Modeling	

<b>Structural Engineering</b>	
ECIV 325	Structural Steel Design
ECIV 327	Reinforced Concrete Design
<b>Transportation Engineering</b>	
ECIV 540	Transportation Systems Planning
ECIV 541	Highway Design
ECIV 542	Traffic Engineering
ECIV 580	Railway Engineering I
<b>Geotechnical Engineering</b>	
ECIV 530	Foundation Analysis and Design
ECIV 531	Design of Earth Structures
<b>Water Resources Engineering</b>	
ECIV 560	Open Channel Hydraulics
ECIV 562	Engineering Hydrology
ECIV 563	Subsurface Hydrology
<b>Basic Science Elective</b>	
Select one of the following:	3-4
BIOL 110	General Biology
BIOL 270	Introduction to Environmental Biology
ENVR 101	Introduction to the Environment
ENVR 321	Environmental Pollution and Health
GEOL 101	Introduction to the Earth
GEOL 103	Environment of the Earth
MSCI 210	Oceans and Society
MSCI 215	Coastal Environments of the Southeastern US
<b>Engineering, Science, or Mathematics (ESM) Electives</b>	
Select four of the following:	12-14
BIOL 101	Biological Principles I
BIOL 102	Biological Principles II
BIOL 110	General Biology
BIOL 250	Microbiology
BIOL 211 and above	
BMEN 211 or above	
CHEM 112 or above	
CSCE 145	Algorithmic Design I
	or CSCE 146 Algorithmic Design II
	or CSCE 201 Introduction to Computer Security
	or CSCE 206 Scientific Applications Programming
	or CSCE 211 Digital Logic Design
ECHE 310	Introductory Chemical Engineering Thermodynamics (or above)
ECIV 210	Dynamics
Additional ECIV courses 300-level and above	
ELCT 220	Electrical Engineering for Non-Majors
ELCT 221	Circuits (or above)
EMCH 290	Thermodynamics (or above) <sup>1</sup>
ENCP 210	Dynamics
ENCP 290	Thermodynamic Fundamentals (or above) <sup>2</sup>
ENVR 331	Integrating Sustainability
ENVR 501	Special Topics in the Environment
ENVR 533	Sustainability Projects Course
GEOG 347	Water as a Resource

GEOG 563	Advanced Geographic Information Systems
GEOL 302	Rocks and Minerals (or above)
ITEC 233	Introduction to Computer Hardware and Software (or above)
MATH 241	Vector Calculus
MATH 300	Transition to Advanced Mathematics
MATH 344	Applied Linear Algebra
MATH 520	Ordinary Differential Equations
MATH 521	Boundary Value Problems and Partial Differential Equations
MATH 544	Linear Algebra
MATH 550	Vector Analysis
MSCI 305	Ocean Data Analysis (and above)
NAVY 201	Naval Ships Systems I
NAVY 202	Naval Ships Systems II
NAVY 301	Navigation/Naval Operations I
PHYS 212	Essentials of Physics II (or above)
STAT 511	Probability
STAT 512	Mathematical Statistics
STAT 513	Theory of Statistical Inference
STAT 516	Statistical Methods II
STAT 520	Forecasting and Time Series
STAT 587	Big Data Analytics
<b>Other Electives</b>	
Select two of the following:	6-8
Additional courses from the ESM Elective category	
ACCT 222	Survey of Accounting
ECON 224	Introduction to Economics
FINA 333	Finance and Markets
MGMT 371	Principles of Management
MGSC 290	Computer Information Systems in Business
MKTG 350	Principles of Marketing
OR any courses from the ESM Elective category	

**Total Credit Hours** **65-71**

<sup>1</sup> Not EMCH 360.

<sup>2</sup> Not ENCP 360.

## 4. Major Requirements (25 hours)

### Major Courses

Course	Title	Credits
ECIV 303	Civil Engineering Materials	3
ECIV 307	Professional Development for Civil Engineers	3
ECIV 320	Structural Analysis I	3
ECIV 330	Introduction to Geotechnical Engineering	3
ECIV 340	Introduction to Transportation Engineering	3
ECIV 350	Introduction to Environmental Engineering	3
ECIV 362	Introduction to Water Resources Engineering	3
ECIV 470	Civil Engineering Design	4

**Total Credit Hours** **25**

## 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.

**Civil Engineering, B.S.E.**