Civil Engineering, B.S.E.

Learning Outcomes
1. Graduates of the program will have an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. Graduates 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.
3. Graduates will have an ability to communicate effectively with a range of audiences.
4. Graduates 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.
5. Graduates 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.
6. Graduates will have an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. Graduates 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/).

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

<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>65-71</td>
</tr>
<tr>
<td>4. Major Requirements</td>
<td>25</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
- 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 ¹ (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 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)
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/)

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 (65-71 hours)

Supporting Courses (65-71 hours)

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundational Required Courses</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>MATH 242</td>
<td>Elementary Differential Equations</td>
<td></td>
</tr>
<tr>
<td>STAT 509</td>
<td>Statistics for Engineers</td>
<td></td>
</tr>
<tr>
<td>or STAT 511</td>
<td>Probability</td>
<td></td>
</tr>
<tr>
<td>Foundational Math Elective</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Select one from the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 241</td>
<td>Vector Calculus</td>
<td></td>
</tr>
<tr>
<td>MATH 300</td>
<td>Transition to Advanced Mathematics</td>
<td></td>
</tr>
<tr>
<td>MATH 344</td>
<td>Applied Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>Foundational Math/Science Elective</td>
<td></td>
<td>3-4</td>
</tr>
<tr>
<td>Select one from the following:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional course from Foundational Math Elective category</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 112</td>
<td>General Chemistry II</td>
<td></td>
</tr>
<tr>
<td>&amp; 112L</td>
<td>and General Chemistry II Lab</td>
<td></td>
</tr>
<tr>
<td>PHYS 212</td>
<td>Essentials of Physics II</td>
<td></td>
</tr>
<tr>
<td>&amp; 212L</td>
<td>and Essentials of Physics II Lab</td>
<td></td>
</tr>
</tbody>
</table>

Lower Division Engineering 18

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECIV 101</td>
<td>Introduction to Civil Engineering</td>
<td></td>
</tr>
<tr>
<td>or ENCP 101</td>
<td>Introduction to Engineering I</td>
<td></td>
</tr>
<tr>
<td>ECIV 111</td>
<td>Introduction to Engineering Graphics and Visualization</td>
<td></td>
</tr>
<tr>
<td>or ENCP 102</td>
<td>Introduction to Engineering II</td>
<td></td>
</tr>
<tr>
<td>ECIV 200</td>
<td>Statics</td>
<td></td>
</tr>
<tr>
<td>or ENCP 200</td>
<td>Statics</td>
<td></td>
</tr>
<tr>
<td>ECIV 201</td>
<td>Computational Methods for Civil Engineering</td>
<td></td>
</tr>
<tr>
<td>or ENCP 201</td>
<td>Introduction to Applied Numerical Methods</td>
<td></td>
</tr>
<tr>
<td>ECIV 220</td>
<td>Mechanics of Solids</td>
<td></td>
</tr>
<tr>
<td>or ENCP 260</td>
<td>Introduction to the Mechanics of Solids</td>
<td></td>
</tr>
<tr>
<td>ECIV 360</td>
<td>Fluid Mechanics</td>
<td></td>
</tr>
<tr>
<td>or ENCP 360</td>
<td>Fluid Mechanics</td>
<td></td>
</tr>
</tbody>
</table>

ECIV Laboratory Courses 2
Select two from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECIV 303L</td>
<td>Civil Engineering Materials Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECIV 330L</td>
<td>Geotechnical Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECIV 340L</td>
<td>Transportation Engineering Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECIV 350L</td>
<td>Introduction to Environmental Engineering Laboratory</td>
<td></td>
</tr>
<tr>
<td>ECIV 362L</td>
<td>Introduction to Water Resources Engineering Laboratory</td>
<td></td>
</tr>
</tbody>
</table>

ECIV Distribution Courses 12
Select one course from four of the following five areas:

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

Structural Engineering
- ECIV 325 Structural Steel Design
Civil Engineering, B.S.E.

ECIV 327  Reinforced Concrete Design
Transportation Engineering
ECIV 540  Transportation Systems Planning
ECIV 541  Highway Design
ECIV 542  Traffic Engineering
ECIV 580  Railway Engineering I
Geotechnical Engineering
ECIV 530  Foundation Analysis and Design
ECIV 531  Design of Earth Structures
Water Resources Engineering
ECIV 560  Open Channel Hydraulics
ECIV 562  Engineering Hydrology
ECIV 563  Subsurface Hydrology

**Basic Science Elective**  3-4
Select one from the following:
- 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

**Engineering, Science, or Mathematics (ESM) Electives**  12-14
Select four courses from the following:
- Additional courses from Foundational Math Elective category,
  Foundational Math/Science Elective category and Basic Science
- Additional ECIV courses 300 level and higher
- BIOL 101  Biological Principles I
- BIOL 102  Biological Principles II
- BIOL 250  Microbiology (and higher)
- BMEN 212  Fundamentals of Biomedical Systems (and higher)
- CHEM 118  Computational Chemistry I (and higher)
- CSCE 145  Algorithmic Design I
- CSCE 146  Algorithmic Design II
- CSCE 201  Introduction to Computer Security
- CSCE 206  Scientific Applications Programming
- CSCE 211  Digital Logic Design
- ECHE 300  Chemical Process Principles (and higher)
- ECIV 210  Dynamics
  or ENCP 210 Dynamics
- ELCT 220  Electrical Engineering for Non-Majors
- ELCT 221  Circuits (and higher)
- EMCH 290  Thermodynamics (or higher (but not ENCP 360))
- ENCP 290  Thermodynamic Fundamentals (and higher (but not ENCP 360))
- ENVR 331  Integrating Sustainability (and higher (but not ENCP 360))
- 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 higher)
- 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 (and higher)
- NAVY 202  Naval Ships Systems II
- PHYS 291  Einstein's Relativity: Understanding by Example
  (and higher)
- NAVY 301  Navigation/Naval Operations I
- STAT 511  Mathematical Statistics
- STAT 512  Probability
- STAT 513  Theory of Statistical Inference
- STAT 516  Statistical Methods II
- STAT 520  Forecasting and Time Series
- STAT 587  Big Data Analytics

Other Electives
Select two courses from the following:
- Additional courses from Foundational Math Elective category,
  Foundational Math/Science Elective category, Basic Science
  category and ESM Elective category.
- Additional ECIV courses 300 level and higher
- 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

**Total Credit Hours**  59-63

### 4. Major Requirements (25 hours)

#### Major Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECIV 303</td>
<td>Civil Engineering Materials</td>
<td>3</td>
</tr>
<tr>
<td>ECIV 307</td>
<td>Professional Development for Civil Engineers</td>
<td>3</td>
</tr>
<tr>
<td>ECIV 320</td>
<td>Structural Analysis I</td>
<td>3</td>
</tr>
<tr>
<td>ECIV 330</td>
<td>Introduction to Geotechnical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ECIV 340</td>
<td>Introduction to Transportation Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ECIV 350</td>
<td>Introduction to Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ECIV 362</td>
<td>Introduction to Water Resources Engineering</td>
<td>3</td>
</tr>
<tr>
<td>ECIV 470</td>
<td>Civil Engineering Design</td>
<td>4</td>
</tr>
</tbody>
</table>

**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.