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/).

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>
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<tr>
<td>1. Carolina Core</td>
<td>34-46</td>
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<tr>
<td>2. College Requirements</td>
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<tr>
<td>3. Program Requirements</td>
<td>65-71</td>
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<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)

Course       Title                  Credits
Foundational Required Courses
MATH 242     Elementary Differential Equations  3
STAT 509     Statistics for Engineers          3
or STAT 511  Probability                      3

Foundational Math Elective 3
Select one of the following:
MATH 241     Vector Calculus                    3
MATH 300     Transition to Advanced Mathematics 3
MATH 344     Applied Linear Algebra            3

Foundational Math/Science Elective 3-4
Select one of the following:
CHEM 112     General Chemistry II and General Chemistry II Lab 3
PHYS 212     Essentials of Physics II and Essentials of Physics II Lab 3
MATH 241     Vector Calculus                    3
MATH 300     Transition to Advanced Mathematics 3
MATH 344     Applied Linear Algebra            3

Lower Division Engineering
ECIV 101     Introduction to Civil Engineering  3
or ENCP 101  Introduction to Engineering I      3
ECIV 111     Introduction to Engineering Graphics and Visualization 3
or ENCP 102  Introduction to Engineering II     3
ECIV 200     Statics                            3
or ENCP 200  Statics                            3
ECIV 201     Computational Methods for Civil Engineering 3
or ENCP 201  Introduction to Applied Numerical Methods 3
ECIV 220     Mechanics of Solids                3
or ENCP 260  Introduction to the Mechanics of Solids 3
ECIV 360     Fluid Mechanics                    3
or ENCP 360  Fluid Mechanics                    3

ECIV Laboratory Courses
Select two of the following: 2
ECIV 303L    Civil Engineering Materials Laboratory 2
ECIV 330L    Geotechnical Laboratory             2
ECIV 340L    Transportation Engineering Laboratory 2
ECIV 350L    Introduction to Environmental Engineering Laboratory 2
ECIV 362L    Introduction to Water Resources Engineering Laboratory 2

ECIV Distribution Courses
Select one course from four of the following five areas: 12
Environmental Engineering
ECIV 551    Elements of Water and Wastewater Treatment 2
ECIV 555    Principles of Municipal Solid Waste Engineering 2
ECIV 556    Air Pollution Control Engineering    2
ECIV 557    Sustainable Construction for Engineers 2
ECIV 558    Environmental Engineering Process Modeling 2

No college-required courses for this program.
Structural Engineering
ECIV 325 Structural Steel Design
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
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

Engineering, Science, or Mathematics (ESM) Electives
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
- ECIV 303 Civil Engineering Materials
- ECIV 307 Professional Development for Civil Engineers
- ECIV 320 Structural Analysis I
- ECIV 330 Introduction to Geotechnical Engineering
- ECIV 340 Introduction to Transportation Engineering
- ECIV 350 Introduction to Environmental Engineering
- ECIV 362 Introduction to Water Resources Engineering
- ECIV 470 Civil Engineering Design

Other Electives
Select two of the following: 6-8

- 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

1. Not EMCH 360.
2. Not ENCP 360.

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.