BACHELOR OF SCIENCE IN CIVIL ENGINEERING (BSCE) DEGREE

The program leading to the BSCE degree is accredited by the Engineering Accreditation Commission (EAC) of ABET, https://www.abet.org (https://www.abet.org/).

Program Learning Outcomes (Student Outcomes) for the BSCE Degree

Upon completing the BSCE degree, students will be able to demonstrate:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. 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. An ability to communicate effectively with a range of audiences.
4. 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. 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. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Program Educational Objectives for the BSCE Degree

Within 3 to 5 years of graduation, graduates with a Bachelor of Science in Civil Engineering (BSCE) degree are expected to attain the following Program Educational Objectives (PEOs):

1. Demonstrate strong problem-solving and communication skills.
2. Achieve leadership positions in technical or managerial areas.
3. Demonstrate initiative and innovation in professional endeavors.
4. Demonstrate engagement in addressing ethical, social, environmental, and global concerns.
5. Remain engaged in continuing learning, including advanced degrees.
6. Obtain a Professional Engineering license, if appropriate.

Requirements for the BSCE Degree

For general university requirements, see Graduation Requirements (https://ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/#text) in Civil Engineering (associated with the BSCE degree), students must additionally identify and declare one of four areas of specialization, either in:

- Area I - Environmental Engineering (p. 3): Air and water quality, transport theory, modeling, and energy, or
- Area II - Hydrology and Water Resources (p. 3): Watershed and aquifer management, flood prediction, data analysis, GIS, and hydrologic modeling, or
- Area III - Structural Engineering and Mechanics (p. 3): Structural analysis, mechanics, design, dynamics, and matrix method, or
- Area IV - Urban Infrastructure, Reliability, and Management (p. 4): Transportation systems, complex urban systems, system reliability, soil mechanics, decision theory, engineering economics, and project management.

Because of the common core requirements, it is possible for students to change their area of specialization at any time, even after initially declaring the major. To do so, please contact the Office of the Registrar (registrar@rice.edu).

Civil and Environmental Engineering’s innovative and challenging BSCE degree’s engineering curriculum is designed to provide significant flexibility to the student. Specific details and typical course layouts by semester can be found on the departmental website (http://ceve.rice.edu/).

The courses listed below satisfy the requirements for this major. In certain instances, courses not on this official list may be substituted upon approval of the major’s academic advisor, or where applicable, the department’s Director of Undergraduate Studies. (Course substitutions must be formally applied and entered into Degree Works by the major’s Official Certifier (https://registrar.rice.edu/facstaff/degreeworks/officialcertifier/) Students and their academic advisors should identify and clearly document the courses to be taken.

Summary

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Credit Hours Required for the Major in Civil Engineering</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours Required for the BSCE Degree</td>
<td>125</td>
</tr>
</tbody>
</table>

Degree Requirements

General Math and Science Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS 201</td>
<td>INTRODUCTORY BIOLOGY I</td>
<td>3</td>
</tr>
<tr>
<td>or EEPS 110</td>
<td>THE EARTH SYSTEM, ENVIRONMENT, AND SOCIETY</td>
<td></td>
</tr>
<tr>
<td>CAAM 210</td>
<td>INTRODUCTION TO ENGINEERING COMPUTATION</td>
<td>3</td>
</tr>
</tbody>
</table>
Elective Requirements

Select 1 from the following Areas of Specialization (see Areas of Specialization below):

- Area I - Environmental Engineering
- Area II - Hydrology and Water Resources
- Area III - Structural Engineering and Mechanics
- Area IV - Urban Infrastructure, Reliability and Management

Elective Requirements

Select electives to fulfill the remaining BSCE degree requirements (see below for suggested elective courses) *

Total Credit Hours Required for the Major in Civil Engineering 92

Additional Credit Hours to Complete Degree Requirements 2

University Graduation Requirements (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/graduation-requirements/) 31

Total Credit Hours 125

Footnotes and Additional Information

* Note: University Graduation Requirements include 31 credit hours, comprised of Distribution Requirements (Groups I, II, and III), FWIS, and LPAP coursework. In some instances, courses satisfying FWIS or distribution requirements may additionally meet other requirements, such as the Analyzing Diversity (AD) requirement, or some of the student’s declared major, minor, or certificate requirements. Additional Credit Hours to Complete Degree Requirements include general electives, coursework completed as upper-level, residency (hours taken at Rice), and/or any other additional academic program requirements.

1 Or an equivalent approved course
2 Students may substitute EEPS 110 with any departmental Earth, Environmental, and Planetary Sciences (EEPS) course offering.
3 The Civil and Environmental Engineering department has determined that credit awarded for PHYS 141 CONCEPTS IN PHYSICS I is not eligible for meeting the requirements of the Civil Engineering major.
4 The Civil and Environmental Engineering department has determined that credit awarded for PHYS 142 CONCEPTS IN PHYSICS II is not eligible for meeting the requirements of the Civil Engineering major.
5 Students may substitute STAT 310 with any departmental (STAT) course offering at the 300-level or above with the exception of STAT 305.
6 Courses that introduce fundamentals of civil and environmental engineering primarily targeted at students with diverse science, engineering, and humanities backgrounds (CEVE 101, CEVE 211, CEVE 310, CEVE 311, CEVE 312)
7 Students following Area of Specialization I-Environmental Engineering or Area of Specialization II-Hydrology and Water Resources must take CEVE 316 as a Core Requirement. Students following Area of Specialization III-Structural Engineering and Mechanics or Area of Specialization IV-Urban Infrastructure, Reliability and Management must take CEVE 472 as a Core Requirement.
8 See also the University Graduation Requirements footnote above denoted with an *.

Areas of Specialization

To fulfill the remaining BSCE degree requirements, students must complete a total of 10 courses (30 credit hours) from the four areas of specialization as follows:

- 8 courses (24 credit hours), consisting of a minimum of 2 courses (6 credit hours) from each of the four areas of specialization as breadth.
- 2 additional courses (6 credit hours) from one of the four areas of specialization for a total of 4 courses (12 credit hours, including breadth) in that specific area as an area of specialization.
### Area of Specialization: Area I - Environmental Engineering

All students must select a minimum of 2 courses (6 credit hours) from Area I. Students pursuing the Area I - Environmental Engineering area of specialization must complete:

- 4 courses (12 credit hours) from Area I - Environmental Engineering
- 2 courses (6 credit hours) from Area II - Hydrology and Water Resources
- 2 courses (6 credit hours) from Area III - Structural Engineering and Mechanics
- 2 courses (6 credit hours) from Area IV - Urban Infrastructure, Reliability and Management

#### Code | Title | Credit Hours
--- | --- | ---
CEVE 302 / ENGI 302 | SUSTAINABLE DESIGN | 12
CEVE 307 / EEPS 307 / ENST 307 | ENERGY AND THE ENVIRONMENT | 12
CEVE 308 | INTRODUCTION TO AIR POLLUTION CONTROL | 12
CEVE 401 | CHEMISTRY FOR ENVIRONMENTAL ENGINEERING AND SCIENCE | 12
CEVE 404 | ATMOSPHERIC PARTICULATE MATTER | 12
CEVE 406 / ENST 406 | INTRODUCTION TO ENVIRONMENTAL LAW | 12
CEVE 411 | ATMOSPHERIC CHEMISTRY AND CLIMATE | 12
CEVE 434 | FATE AND TRANSPORT OF CONTAMINANTS IN THE ENVIRONMENT | 12
CEVE 444 | ENVIRONMENTAL MICROBIOLOGY AND MICROBIAL ECOLOGY | 12

Or any approved (Area I - Environmental Engineering) course from CEVE course offerings

Select 2 courses (6 credit hours) from the Area II - Hydrology and Water Resources Area of Specialization

Select 2 courses (6 credit hours) from the Area III - Structural Engineering and Mechanics Area of Specialization

Select 2 courses (6 credit hours) from the Area IV - Urban Infrastructure, Reliability and Management Area of Specialization

**Total Credit Hours:** 30

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### Area of Specialization: Area II - Hydrology and Water Resources

All students must select a minimum of 2 courses (6 credit hours) from Area II. Students pursuing the Area II - Hydrology and Water Resources area of specialization must complete:

- 4 courses (12 credit hours) from Area II - Hydrology and Water Resources
- 2 courses (6 credit hours) from Area I - Environmental Engineering
- 2 courses (6 credit hours) from Area III - Structural Engineering and Mechanics
- 2 courses (6 credit hours) from Area IV - Urban Infrastructure, Reliability and Management

#### Code | Title | Credit Hours
--- | --- | ---
CEVE 314 / BISE 365 / GLHT 314 | SUSTAINABLE WATER PURIFICATION FOR THE DEVELOPING WORLD | 12
CEVE 412 | HYDROLOGY AND WATER RESOURCES ENGINEERING | 12
CEVE 420 | ENVIRONMENTAL REMEDIATION RESTORATION | 12
CEVE 518 | ENVIRONMENTAL HYDROGEOLOGY | 12

Select 2 courses (6 credit hours) from the Area I - Environmental Engineering Area of Specialization

Select 2 courses (6 credit hours) from the Area III - Structural Engineering and Mechanics Area of Specialization

Select 2 courses (6 credit hours) from the Area IV - Urban Infrastructure, Reliability and Management Area of Specialization

**Total Credit Hours:** 30

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### Area of Specialization: Area III - Structural Engineering and Mechanics

All students must select a minimum of 2 courses (6 credit hours) from Area III. Students pursuing the Area III - Structural Engineering and Mechanics area of specialization must complete:

- 4 courses (12 credit hours) from Area III - Structural Engineering and Mechanics
- 2 courses (6 credit hours) from Area I - Environmental Engineering
- 2 courses (6 credit hours) from Area II - Hydrology and Water Resources
- 2 courses (6 credit hours) from Area IV - Urban Infrastructure, Reliability and Management

#### Code | Title | Credit Hours
--- | --- | ---
CEVE 325 | STRUCTURAL ANALYSIS AND MODELING | 12
CEVE 400 / MECH 400 | ADVANCED MECHANICS OF MATERIALS | 12
CEVE 427 / MECH 427 | PHYSICS GUIDED MACHINE LEARNING & DATA DRIVEN MODELING FEM | 12
CEVE 431 & CEVE 432 | DESIGN AND BEHAVIOR OF CONCRETE BUILDINGS AND BUILDING ELEMENTS and CONCRETE AND STEEL STRUCTURES LABORATORY | 12
CEVE 441 | DESIGN AND BEHAVIOR OF STRUCTURAL STEEL BUILDINGS AND BUILDING ELEMENTS | 12
CEVE 476 | STRUCTURAL DYNAMIC SYSTEMS | 12
CEVE 496 / MECH 466 | SYSTEM IDENTIFICATION OF DYNAMIC SYSTEMS WITH MACHINE LEARNING | 12

Or any approved (Area III Structural Engineering and Mechanics) course from CEVE/MECH course offerings

Select 2 courses (6 credit hours) from the Area I - Environmental Engineering Area of Specialization

Select 2 courses (6 credit hours) from the Area II - Hydrology and Water Resources Area of Specialization

**Total Credit Hours:** 30
Area of Specialization: Area IV - Urban Infrastructure, Reliability and Management

All students must select a minimum of 2 courses (6 credit hours) from Area IV. Students pursuing the Area IV - Urban Infrastructure, Reliability and Management area of specialization must complete:

- 4 courses (12 credit hours) from Area IV - Urban Infrastructure, Reliability and Management
- 2 courses (6 credit hours) from Area I - Environmental Engineering
- 2 courses (6 credit hours) from Area II - Hydrology and Water Resources
- 2 courses (6 credit hours) from Area III - Structural Engineering and Mechanics

Select 4 courses from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEVE 301</td>
<td>ENGINEERING ECONOMICS AND PROJECT MANAGEMENT</td>
<td>3</td>
</tr>
<tr>
<td>CEVE 313 / STAT 313</td>
<td>UNCERTAINTY AND RISK IN URBAN INFRASTRUCTURES</td>
<td>3</td>
</tr>
<tr>
<td>CEVE 320 / ENGI 320</td>
<td>ETHICS AND ENGINEERING LEADERSHIP</td>
<td>3</td>
</tr>
<tr>
<td>CEVE 424</td>
<td>TIME-DEPENDENT SYSTEM RELIABILITY METHODS AND APPLICATIONS</td>
<td>3</td>
</tr>
<tr>
<td>CEVE 452</td>
<td>URBAN TRANSPORTATION SYSTEMS</td>
<td>3</td>
</tr>
<tr>
<td>CEVE 460</td>
<td>BRIDGE ENGINEERING AND EXTREME EVENTS</td>
<td>3</td>
</tr>
<tr>
<td>CEVE 492</td>
<td>MODELING AND ANALYSIS OF NETWORKED SYSTEMS</td>
<td>3</td>
</tr>
</tbody>
</table>

Or any approved (Area IV - Urban Infrastructure, Reliability and Management) course from CEVE/EG/STAT course offerings

Select 2 courses (6 credit hours) from the Area I - Environmental Engineering Area of Specialization

Select 2 courses (6 credit hours) from the Area II - Hydrology and Water Resources Area of Specialization

Select 2 courses (6 credit hours) from the Area III - Structural Engineering and Mechanics Area of Specialization

Total Credit Hours: 30

Suggested Electives for the BSCE Degree

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEVE 417 / MECH 417</td>
<td>FINITE ELEMENT ANALYSIS</td>
<td>3</td>
</tr>
<tr>
<td>CEVE 424</td>
<td>TIME-DEPENDENT SYSTEM RELIABILITY METHODS AND APPLICATIONS</td>
<td>3</td>
</tr>
<tr>
<td>CEVE 454 / BIOE 454 / MECH 454</td>
<td>COMPUTATIONAL FLUID MECHANICS</td>
<td>3</td>
</tr>
<tr>
<td>CEVE 499</td>
<td>SPECIAL PROBLEMS</td>
<td>1-12</td>
</tr>
</tbody>
</table>

Total Credit Hours: 30

Footnotes and Additional Information

1. Offered alternative years

Policies for the BSCE Degree

Program Restrictions and Exclusions

Students pursuing the BSCE Degree should be aware of the following program restrictions:

- As noted in Majors, Minors, and Certificates (https://ga.rice.edu/undergraduate-students/academic-opportunities/majors-minors-certificates/), under Declaring Majors, Minors and Certificates, students may not obtain both a BA and a BS in the same major. Students pursuing the Bachelor of Science in Civil Engineering (BSCE) Degree may not additionally pursue the BA Degree with a Major in Civil and Environmental Engineering.

Transfer Credit

For Rice University’s policy regarding transfer credit, see Transfer Credit (https://ga.rice.edu/undergraduate-students/academic-policies-procedures/transfer-credit/). Some departments and programs have additional restrictions on transfer credit. The Office of Academic Advising maintains the university’s official list of transfer credit advisors (https://oaa.rice.edu/advising-network/transfer-credit-advisors/) on their website: https://oaa.rice.edu. Students are encouraged to meet with their academic program’s transfer credit advisor when considering transfer credit possibilities.

Departmental Transfer Credit Guidelines

Students pursuing the BSCE Degree should be aware of the following departmental transfer credit guidelines:

- Requests for transfer credit will be considered by the program director (and/or the program’s official transfer credit advisor) on an individual case-by-case basis.

Additional Information

For additional information, please see the Civil and Environmental Engineering website: https://cee.rice.edu/

Opportunities for the BSCE Degree

Academic Honors

The university recognizes academic excellence achieved over an undergraduate’s academic history at Rice. For information on university honors, please see Latin Honors (https://ga.rice.edu/undergraduate-students/honors-distinctions/university/) (summa cum laude, magna cum laude, and cum laude) and Distinction in Research and Creative
Undergraduate Students

Fifth-Year Master’s Degree Option for Rice Undergraduate Students

In certain situations and with some terminal master’s degree programs, Rice students have an option to pursue a master’s degree by adding an additional fifth year to their four years of undergraduate studies.

Advanced Rice undergraduate students in good academic standing typically apply to the master’s degree program during their junior or senior year. Upon acceptance, depending on course load, financial aid status, and other variables, they may then start taking some required courses of the master’s degree program. A plan of study will need to be approved by the student’s undergraduate major advisor and the master’s degree program director.

As part of this option and opportunity, Rice undergraduate students:

- must complete the requirements for a bachelor’s degree and the master’s degree independently of each other (i.e. no course may be counted toward the fulfillment of both degrees).
- should be aware there could be financial aid implications if the conversion of undergraduate coursework to that of graduate level reduces their earned undergraduate credit for any semester below that of full-time status (12 credit hours).
- more information on this Undergraduate - Graduate Concurrent Enrollment opportunity, including specific information on the registration process can be found here.

Rice undergraduate students completing studies in science and engineering may have the option to pursue the Master of Civil and Environmental Engineering (MCEE) degree. For additional information, students should contact their undergraduate major advisor and the (MCEE) chair of the department graduate studies committee.

Student Organizations and Clubs

- **American Society of Civil Engineers Student (ASCE):** [https://www.asce.org/communities/student-members/](https://www.asce.org/communities/student-members/)
  ASCE seeks to promote civil and environmental engineering, expose students to real world engineering, and connect students to alumni and professionals. Throughout the year we invite speakers from the industry, visit plants and sites, and organize social events. The objectives of this Chapter are to encourage the development of a professional consciousness, to afford an opportunity for civil engineering students to become acquainted and to practice working together effectively, to promote a spirit of congeniality among them, and to provide friendly contact with the engineering profession. We also support the Concrete Canoe competition (see below) and the Seismic Design Competition of the Earthquake Engineering Research Institute (EERI).

- **Chi Epsilon:** [https://www.chi-epsilon.org/](https://www.chi-epsilon.org/)
  Chi Epsilon is dedicated to maintaining and promoting the status of civil engineering as an ideal profession. Chi Epsilon was organized to recognize the characteristics of the individual civil engineering deemed to be fundamental to the successful pursuit of an engineering career, and to aid in the development of those characteristics in the civil engineering student.

- **Engineers Without Borders (EWB):** [https://ewb.rice.edu/](https://ewb.rice.edu/)
  EWB partners with developing communities worldwide to design engineering solutions that will improve their standards of living. It is an important component of the Civil and Environmental Engineering program. BA students with their flexible curriculum are encouraged to participate. This exciting endeavor allows undergraduates to have an experience in a developing country, where they are able to design and build a project to help society. Students have been attracted to the EWB program in large numbers and our local chapter is one of the most successful in the United States. Some CEVE courses are EWB-related, providing the opportunity to also obtain credit hours.

- **Concrete Canoe:** [https://concretecanoe.rice.edu/](https://concretecanoe.rice.edu/)
  Rice Concrete Canoe is a student-run club that creates a functional concrete canoe to race and present at the yearly ASCE sponsored competition. Through the year, members gain engineering experience through the research, planning and constructing of a concrete canoe. By offerings members exposure to the engineering design process, small-group work, software such as Matlab and Adobe Illustrator (and possibly more starting this year), and laser cutters, Concrete Canoe offers a unique experience to students regardless of whether or not they want to become engineers.

- **Society of Women Engineers:** [https://swe.rice.edu/](https://swe.rice.edu/)
  The Society of Women Engineers aims to empower women to pursue and achieve their full potential in science and engineering related fields. We provide opportunities in professional development, academic and post-graduate planning, community outreach, and social events.
Additional Information
For additional information, please see the Civil and Environmental Engineering website: https://cee.rice.edu/