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-policies-procedures/graduation-requirements/). Students pursuing the BSCE degree must complete:

- A minimum of 35-36 courses (94-95 credit hours), depending on course selection, to satisfy major requirements.
- A minimum of 19 courses (54 credit hours) taken at the 300-level or above.
- The requirements for one area of specialization (see below for areas of specialization). When students declare the major (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
  - Area II - Hydrology and Water Resources
  - Area III - Structural Engineering and Mechanics
  - Area IV - Urban Infrastructure, Reliability, and Management
- A minimum of 16 courses (40-41 credit hours, depending on course selection) from the General Math and Science courses.
- A minimum of 9 courses (24 credit hours) from the Core Requirements.

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>
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</thead>
<tbody>
<tr>
<td></td>
<td>Total Credit Hours Required for the Major in Civil Engineering</td>
<td>94-95</td>
</tr>
<tr>
<td></td>
<td>Total Credit Hours Required for the BSCE Degree</td>
<td>133-134</td>
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</tbody>
</table>

Degree Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAAM</td>
<td>INTRODUCTION TO ENGINEERING</td>
<td>3</td>
</tr>
<tr>
<td>CAAM</td>
<td>MATRIX ANALYSIS</td>
<td>3</td>
</tr>
</tbody>
</table>

1 General Math and Science Requirements
or MATH 354 HONORS LINEAR ALGEBRA
or MATH 355 LINEAR ALGEBRA
CHEM 121 GENERAL CHEMISTRY I 3
or CHEM 111 AP/OTH CREDIT IN GENERAL CHEMISTRY I 1
CHEM 123 GENERAL CHEMISTRY LABORATORY I 1
or CHEM 113 AP/OTH CREDIT IN GENERAL CHEMISTRY LAB I 1
CHEM 122 GENERAL CHEMISTRY II 3
or CHEM 112 AP/OTH CREDIT IN GENERAL CHEMISTRY II 1
CHEM 124 GENERAL CHEMISTRY LABORATORY II 1
or CHEM 114 AP/OTH CREDIT IN GENERAL CHEMISTRY LAB II 1
ESCI 115 INTRODUCTION TO THE EARTH 2 3-4
or BIOS 201 INTRODUCTORY BIOLOGY I 1
MATH 101 SINGLE VARIABLE CALCULUS I 3
or MATH 105 AP/OTH CREDIT IN CALCULUS I 1
MATH 102 SINGLE VARIABLE CALCULUS II 3
or MATH 106 AP/OTH CREDIT IN CALCULUS II 1
MATH 211 ORDINARY DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA 3
MATH 212 MULTIVARIABLE CALCULUS 3
PHYS 101 MECHANICS (WITH LAB) and MECHANICS DISCUSSION 4
& PHYS 103 and MECHANICS DISCUSSION 4
PHYS 102 ELECTRICITY & MAGNETISM (WITH LAB) 4
& PHYS 104 and ELECTRICITY AND MAGNETISM DISCUSSION 4
STAT 310 / ECON 307 PROBABILITY AND STATISTICS 3

Core Requirements 4

CEVE 211 / MECH 211 ENGINEERING MECHANICS 5 3
CEVE 310 PRINCIPLES OF ENVIRONMENTAL ENGINEERING 5 3
CEVE 311 / MECH 311 MECHANICS OF SOLIDS AND STRUCTURES 5 3
CEVE 312 STRENGTH OF MATERIALS LAB 5 1
CEVE 315 URBAN WATER SYSTEMS: SOURCES, TREATMENT, DISTRIBUTION, RESOURCE RECOVERY AND REUSE 3
CEVE 363 APPLIED FLUID MECHANICS 3
Select 1 from the following: 4 4

CEVE 316 & CEVE 401 URBAN WATER SYSTEMS LAB: WATER QUALITY PARAMETERS AND TREATMENT TECHNIQUES and CHEMISTRY FOR ENVIRONMENTAL ENGINEERING AND SCIENCE
CEVE 471 & CEVE 472 PRINCIPLES OF SOIL MECHANICS AND FOUNDATION ENGINEERING and SOIL MECHANICS LABORATORY WITH INDIVIDUAL PARTICIPATION
CEVE 480 SENIOR DESIGN 3
CEVE 481 INTRODUCTION TO SENIOR DESIGN 1

Area of Specialization

Select 1 from the following Areas of Specialization (see Areas of Specialization below): 30

Area I - Environmental Engineering
Area II - Hydrology and Water Resources

Elective Requirements
Select electives to fulfill the remaining BSCE degree requirements (see below for suggested elective courses) 6

Total Credit Hours Required for the Major in Civil Engineering 94-95

Additional Credit Hours to Complete Degree Requirements 8

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

Total Credit Hours 133-134

Footnotes and Additional Information

1 Or an equivalent approved course
2 Students may substitute ESCI 115 with any departmental (ESCI) course offering.
3 Students may substitute STAT 310 with any departmental (STAT) course offering at the 300-level or above with the exception of STAT 305.
4 Please Note: For students pursuing an area of specialization in Environmental Engineering (Area I) or Hydrology and Water Resources (Area II), CEVE 316 and CEVE 401 are required, and CEVE 471 and CEVE 472 are Urban Infrastructure, Reliability, and Management (Area IV) electives. For students pursuing an area of specialization in Structural Engineering and Mechanics (Area III) or Urban Infrastructure, Reliability, and Management (Area IV), CEVE 471 and CEVE 472 are required and CEVE 401 is an Environmental Engineering (Area I) elective.
5 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)
6 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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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</thead>
<tbody>
<tr>
<td>CEVE 302 / ENGI 302</td>
<td>SUSTAINABLE DESIGN</td>
<td>12</td>
</tr>
<tr>
<td>CEVE 307 / ENST 307 / ESCI 307</td>
<td>ENERGY AND THE ENVIRONMENT</td>
<td>6</td>
</tr>
<tr>
<td>CEVE 308</td>
<td>INTRODUCTION TO AIR POLLUTION CONTROL</td>
<td></td>
</tr>
<tr>
<td>CEVE 404</td>
<td>ATMOSPHERIC PARTICULATE MATTER</td>
<td>6</td>
</tr>
<tr>
<td>CEVE 406 / ENST 406</td>
<td>INTRODUCTION TO ENVIRONMENTAL LAW</td>
<td></td>
</tr>
<tr>
<td>CEVE 411</td>
<td>ATMOSPHERIC CHEMISTRY AND CLIMATE</td>
<td></td>
</tr>
<tr>
<td>CEVE 434</td>
<td>FATE AND TRANSPORT OF CONTAMINANTS IN THE ENVIRONMENT</td>
<td>6</td>
</tr>
<tr>
<td>CEVE 444</td>
<td>ENVIRONMENTAL MICROBIOLOGY AND MICROBIAL ECOLOGY</td>
<td>6</td>
</tr>
</tbody>
</table>

Select 4 courses from the following:

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

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</tr>
</thead>
<tbody>
<tr>
<td>CEVE 314</td>
<td>SUSTAINABLE WATER PURIFICATION FOR THE DEVELOPING WORLD</td>
<td>12</td>
</tr>
<tr>
<td>CEVE 412</td>
<td>HYDROLOGY AND WATER RESOURCES ENGINEERING</td>
<td></td>
</tr>
<tr>
<td>CEVE 418 / ESCI 418</td>
<td>QUANTITATIVE HYDROGEOLOGY</td>
<td></td>
</tr>
</tbody>
</table>

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
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:

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<thead>
<tr>
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<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEVE 301</td>
<td>ENGINEERING ECONOMICS AND PROJECT MANAGEMENT</td>
<td>12</td>
</tr>
<tr>
<td>CEVE 313/STAT 313</td>
<td>UNCERTAINTY AND RISK IN URBAN INFRASTRUCTURES</td>
<td></td>
</tr>
<tr>
<td>CEVE 320/ENGI 320</td>
<td>ETHICS AND ENGINEERING LEADERSHIP</td>
<td></td>
</tr>
<tr>
<td>CEVE 424</td>
<td>TIME-DEPENDENT SYSTEM RELIABILITY METHODS AND APPLICATIONS 1</td>
<td></td>
</tr>
<tr>
<td>CEVE 452</td>
<td>URBAN TRANSPORTATION SYSTEMS</td>
<td></td>
</tr>
<tr>
<td>CEVE 460</td>
<td>BRIDGE ENGINEERING AND EXTREME EVENTS 1</td>
<td></td>
</tr>
<tr>
<td>CEVE 492</td>
<td>MODELING AND ANALYSIS OF NETWORKED SYSTEMS 1</td>
<td></td>
</tr>
</tbody>
</table>

Or any approved (Area IV - Urban Infrastructure, Reliability and Management) course from CEVE/ MGMT/ECON/ CAAM/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

Footnotes and Additional Information

1 Offered alternative years

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 101</td>
<td>FUNDAMENTALS OF CIVIL AND ENVIRONMENTAL ENGINEERING</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 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 3</td>
<td>3</td>
</tr>
<tr>
<td>CEVE 454/BIOE 454/MECH 454</td>
<td>COMPUTATIONAL FLUID MECHANICS</td>
<td>3</td>
</tr>
</tbody>
</table>

For Rice University's policy regarding transfer credit, see Transfer Credit (https://qa.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 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://ceve.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/). Some departments and programs have department-specific Honors awards or designations.

Departmental Honor, Award, and Scholarship Opportunities

- Distinction in Research and Creative Work: The Department of Civil and Environmental Engineering will recognize graduating seniors for outstanding creative contributions with the award of Distinction in Research and Creative Work. The Department recognizes this award as being a significant honor. As such, it will be awarded to no more
Student Organizations and Clubs

- **American Society of Civil Engineers Student (ASCE):** [https://www.asce.org/membership/student/](https://www.asce.org/membership/student/)

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/xewebgeneral2/](https://www.chi-epsilon.org/xewebgeneral2/).

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 degree 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.

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

Rice students have an option to pursue the Master of Civil and Environmental Engineering (MCEE) degree by adding an additional fifth year to their four undergraduate years of science and engineering studies.

Advanced Rice undergraduate students in good academic standing may apply to the MCEE 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 advisor and the (MCEE) chair of the department graduate studies committee.

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

- must complete the requirements for their 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 of the 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 possibility, including specific information on the registration process can be found here ([https://qa.rice.edu/undergraduate-students/academic-opportunities/undergraduate-graduate-concurrent-enrollment/](https://qa.rice.edu/undergraduate-students/academic-opportunities/undergraduate-graduate-concurrent-enrollment/)).

### Additional Information

For additional information, please see the Civil and Environmental Engineering website: [https://ceve.rice.edu/](https://ceve.rice.edu/).