

# Bachelor of Science in Civil Engineering

## Civil Engineering (BSCE)

The undergraduate degree in civil engineering prepares graduates for entry into professional practice and continued intellectual and professional development throughout their career. The program prepares its graduates to serve as master planners, designers, constructors, and operators/managers of the built environment as well as stewards of natural resources and the environment. Civil engineering graduates are also prepared to serve as both innovators and integrators in the application of existing and developing technologies in the creation and maintenance of society's infrastructure. They also serve as evaluators and managers of risk and uncertainty and apply engineering knowledge and science to the protection of the built environment and public health.

The curriculum in civil engineering is designed to provide education in fundamental engineering sciences, certain nontechnical subjects, and all major areas of civil engineering, which will serve as a basis for entrance into civil engineering practice and/or graduate study. Technical elective courses are available that allow pursuit of several programs of study or specialization:

- Geotechnical
- Hydraulics and water resources
- Environmental
- Transportation
- Structural
- Coastal

In addition, course work in General Education skills and ways of knowing is required to assure a well-rounded program of study.

### Civil Engineering Program Mission

To serve the students and the engineering community locally, nationally, and globally by offering rigorous undergraduate curricula in civil engineering and environmental engineering that prepare students for an ethical and successful professional career, including advanced studies and life-long learning.

### Civil Engineering Program Objectives

The program educational objectives describe the expected accomplishments of graduates during the first few years after graduation. The educational objectives of the civil engineering program, established with participation of all constituencies, are consistent with the mission of Old Dominion University and the Department of Civil and Environmental Engineering.

The objectives of the civil engineering program are to produce graduates who will:

- Successfully practice and/or pursue advanced studies in civil engineering or other fields.
- Effectively communicate the technical and social implications of civil engineering solutions.
- Fully acknowledge and rigorously apply best practices in their chosen fields.
- Advance in the professional community through ethical practice, collaboration, and service.

### Civil Engineering Program Outcomes

The program outcomes are statements that describe what students are expected to know and be able to do by the time of graduation. The program outcomes have been established based on the program educational objectives, in consultation with the advisory council as documented in the minutes of the Civil and Environmental Engineering Visiting Council (CEEVC) meetings.

Students who qualify for graduation will have:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, and global, cultural, social, environmental, economic, and other factors as appropriate to the discipline.
3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
4. An ability to communicate effectively with a range of audiences.
5. 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.
6. An ability to recognize the ongoing need for additional knowledge, to choose appropriate learning strategies, and to apply this knowledge.
7. An ability to function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, and creates a collaborative and inclusive environment.

In addition, students will have had opportunities for work experience through internships, practicum, and cooperative education. They will also have had opportunities to participate in student organizations for exposure to community service and for developing leadership skills. The students will be able to apply knowledge in environmental, geotechnical, structural, transportation, and water resources engineering.

In addition to the curriculum detailed below, all students in the Civil Engineering program are required to take the Fundamentals of Engineering exam (<http://ncees.org/exams/fe-exam/>) prior to graduation. Any student passing the FE exam prior to graduation will receive a reimbursement for the exam fee paid by the CEEVC.

### Accreditation

The Bachelor of Science in Civil Engineering is accredited by the Engineering Accreditation Commission of ABET [www.abet.org](http://www.abet.org). (<http://www.abet.org>)

### Requirements

#### Lower-Division General Education

Written Communication ( <a href="https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#written">https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#written</a> )	6
Oral Communication ( <a href="https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#oral">https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#oral</a> )	3
Mathematics ( <a href="https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#math">https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#math</a> )	3
Language and Culture ( <a href="https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#language">https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#language</a> )	0-6
Information Literacy and Research ( <a href="https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#information">https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#information</a> )	3
Human Behavior ( <a href="https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#behavior">https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#behavior</a> )	3
Human Creativity ( <a href="https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#creativity">https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#creativity</a> )	3
Interpreting the Past ( <a href="https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#interpret">https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#interpret</a> )	3
Literature ( <a href="https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#literature">https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#literature</a> )	3
Philosophy and Ethics ( <a href="https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#philosophy">https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#philosophy</a> )	3
The Nature of Science ( <a href="https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#nature">https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#nature</a> )	8
Impact of Technology ( <a href="https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#impact">https://catalog.odu.edu/undergraduate/requirements-undergraduate-degrees/#impact</a> )	3

The General Education requirements in information literacy and research, impact of technology, and philosophy and ethics are met through the major.

## Upper-Division General Education

- Option A. Approved Minor, 12-24 credit hours; also second degree or second major
- Option B. Interdisciplinary Minor; 12 credit hours, (3 credit hours may be in the major area of study)
- Option C. An approved certification program such as teaching licensure (hours vary)
- Option D. Two Upper-Division Courses (6 credit hours) from outside the College of Engineering and Technology and are not required by the major.

## Requirements for Graduation

Requirements for graduation include the following:

- Minimum of 120 credit hours.
- Minimum of 30 credit hours overall and 12 credit hours of upper-level courses in the major program from Old Dominion University.
- Minimum overall cumulative grade point average of C (2.00) in all courses taken.
- Minimum overall cumulative grade point average of C (2.00) in all courses taken toward the major.
- Minimum overall cumulative grade point average of C (2.00) in all courses taken toward a minor.
- Completion of ENGL 110C, ENGL 211C or ENGL 231C, and the writing intensive (W) course in the major with a grade of C or better. The W course must be taken at Old Dominion University.
- Completion of Senior Assessment.

## Civil Engineering Major

In addition to the requirements shown in the degree program guide, all students in the Civil Engineering program are required to take the Fundamentals of Engineering exam (<https://ncees.org/engineering/fe/>) prior to graduation. Any student passing the FE exam prior to graduation will receive a reimbursement for the exam fee by the CEEVC.

### General Education

Complete lower-division requirements	33-39
Complete upper-division requirements (minimum of 6 credit hours)	6

### Civil Engineering Major

Complete civil engineering departmental and major requirements as shown on the degree program guide	84
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**Total Credit Hours** **123-129**

## Degree Program Guide\*

The Degree Program Guide is a suggested curriculum to complete this degree program in four years. It is just one of several plans that will work and is presented only as broad guidance to students. Each student is strongly encouraged to develop a customized plan in consultation with their academic advisor. Additional information can also be found in Degree Works.

Course	Title	Credit Hours
<b>Freshman</b>		
<b>First Semester</b>		
MATH 211	Calculus I (Grade of C or better required)	4
CHEM 121N	Foundations of Chemistry I Lecture	3
CHEM 122N	Foundations of Chemistry I Laboratory	1

ENGN 121	Introduction to Engineering and Technology	4
Human Creativity		3
<b>Credit Hours</b>		<b>15</b>
<b>Second Semester</b>		
ENGN 122	MATLAB and C++ Programming for Engineers	4
ENGL 110C	English Composition (Grade of C or better required)	3
MATH 212	Calculus II (Grade of C or better required)	4
PHYS 231N	University Physics I	4
<b>Credit Hours</b>		<b>15</b>
<b>Sophomore</b>		
<b>First Semester</b>		
CEE 204	Statics (Grade of C or better required)	3
COMM 101R	Public Speaking	3
MATH 312	Calculus III (or MATH 285)	4
PHYS 232N	University Physics II	4
CEE 240	Geographic Information Systems in Civil and Environmental Engineering	2
<b>Credit Hours</b>		<b>16</b>
<b>Second Semester</b>		
CEE 205	Engineering Dynamics	3
CEE 220	Mechanics of Deformable Bodies	3
ENGL 211C or ENGL 231C	Writing, Rhetoric, and Research (Grade of C or better required) or Writing, Rhetoric, and Research: Special Topics	3
Literature		3
Science Elective (BIOL 110N/111N or OEAS 111N)		4
<b>Credit Hours</b>		<b>16</b>
<b>Junior</b>		
<b>First Semester</b>		
MATH 307	Ordinary Differential Equations (or MATH 280)	3
CEE 304	Probability and Statistics for Civil Infrastructure	3
CEE 310	Structures I (Grade of C or better required)	3
CEE 320	Civil Engineering Materials	3
CEE 330	Hydromechanics (Grade of C or better required)	3
<b>Credit Hours</b>		<b>15</b>
<b>Second Semester</b>		
CEE 305	Numerical Methods for Civil and Environmental Engineering	1
CEE 323	Soil Mechanics (Grade of C or better required)	3
CEE 324	Soil Mechanics Laboratory	1
CEE 340	Hydraulics and Water Resources	3
CEE 341	CE Hydraulics and Water Resources Laboratory	1

CEE 350	Environmental Pollution and Control	3
Interpreting the Past		3
<b>Credit Hours</b>		<b>15</b>
<b>Senior</b>		
<b>First Semester</b>		
CEE 370	Transportation Fundamentals	3
CEE 410	Concrete Design	3
CEE 430	Foundation Engineering	3
CEE 402	Professional Practice of Engineering	1
Gen Ed - Upper Level Requirement 1		3
Human Behavior		3
<b>Credit Hours</b>		<b>16</b>
<b>Second Semester</b>		
CEE 403W	Civil Engineering Design Project and Professional Practice (Grade of C or better required)	3
CEE 4XX		3
CEE 4XX		3
ENMA 480	Ethics and Philosophy in Engineering Applications **	3
Gen Ed - Upper Level Requirement 2		3
<b>Credit Hours</b>		<b>15</b>
<b>Total Credit Hours</b>		<b>123</b>

\* Does not include the University's General Education language and culture requirement. Additional hours may be required.

\*\* Meets philosophy and ethics general education requirement.

## Dual Dominion Bachelor's/Master's Degree Programs

Dual Dominion Bachelor's/Master's programs are designed to allow qualified students to secure a space in a master's program available in the Frank Batten College of Engineering and Technology while they are still pursuing their undergraduate degrees. An eligible student can choose a master's program in the same discipline as his/her bachelor's program or in a complementary discipline. Subject to the approval of the undergraduate and graduate program directors, a student enrolled in a Dual Dominion program can count up to six credit hours of course work towards both the undergraduate and the graduate degrees. Full-time students may be able to complete the requirements for the bachelor's degree in four years and the master's degree in one additional year. Students in Dual Dominion programs must earn a minimum of 150 credit hours (120 discrete credit hours for the undergraduate degree and 30 discrete credit hours for the graduate degree).

Students who are matriculated in an undergraduate major in the Frank Batten College of Engineering and Technology with a GPA of at least 3.00 overall and 3.00 in the major are eligible to apply for admission to a Dual Dominion Bachelor's/Master's program. Transfer students who desire to be admitted to a Dual Dominion program at the time they join an undergraduate major at Old Dominion University are eligible to apply if their overall GPA at their previous institution is 3.25 or higher. Prerequisite courses may be required for engineering technology majors to pursue a master's degree in engineering.

Continuance in a Dual Dominion Bachelor's/Master's program requires maintenance of a GPA of 3.00 or higher overall and in the major.

## Dual Dominion Bachelor-to-PhD Programs

For a select number of exceptionally well-qualified students, the college has established a Dual Dominion doctoral program that enables students to be admitted directly into the PhD program upon completion of the baccalaureate degree. A select number of exceptionally well-qualified students can be admitted to the Bachelor/PhD program in their junior year while they are pursuing one of the undergraduate programs at Old Dominion University. This program encourages admitted students to work closely with faculty members and pursue a research experience. Just as in the Dual Dominion Bachelor/Masters program, six credit hours of graduate course work may again be counted towards the undergraduate degree and doctoral course work mentioned above for the Bachelor/PhD program. For Dual Dominion bachelor's to doctoral programs, students must earn a minimum of 198 credit hours (120 discrete credit hours for the undergraduate degree and 78 discrete credit hours for the graduate degree). Students in these programs must maintain a GPA of 3.50 or better throughout their bachelor's and doctoral studies.

The student may opt to obtain the master's degree along the way to the doctorate. To obtain the master's degree, the student must utilize the six graduate credits obtained as part of their undergraduate program, use 18 credits of the graduate course work that is part of the PhD, and work with the Graduate Program Director to plan the final 6 credits.