

## Civil Engineering

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Civil Engineering, the oldest branch of the engineering profession, utilizes knowledge of mathematics and science, while applying judgment, to design economic means for improving the well-being of humanity: by providing designs for community living, industry, and transportation; and by designing structures for the use of humankind. One of the rare historical records of civil engineering within academia is contained in the first catalogue of this university, dated August 1821. Among the description of offerings to students in 1820 was . . . "Civil Engineering, including the construction of roads, canals, locks and bridges." This institution was thus the first private school in the United States where students were taught engineering as a separate branch of education. Two of its earliest alumni, Alfred W. Craven and Moncure Robinson, were prominent in the formation of the American Society of Civil Engineers in 1852.

The Civil & Environmental Engineering field encompasses planning, design, construction, and maintenance of structures, which often includes altering the natural geography to meet human needs. Civil Engineers plan, design, construct, and maintain suspension bridges, dams, tunnels, skyscrapers, the Interstate highway system, airports, ports, shopping centers, residential developments, water delivery and purification facilities, and irrigation systems. During their first two years, students learn the fundamental mathematical and scientific principles essential for engineering analysis and design. Principles of the design process are introduced in the first engineering courses and continually emphasized and practiced in the subsequent engineering courses. The last two years of the curriculum are devoted to providing a sound grounding in five major civil engineering sub-disciplines: water resources, structural, environmental, geotechnical, and construction. The design experience culminates in the senior year with a major design project. Because laboratory experience is deemed essential to learning, participatory laboratories reinforce principles learned in lectures and permit students to learn through inquiry. To this end, laboratory sections are kept small and require student participation. Use of the computer for both analysis and design is an integral part of the curriculum and the department maintains a computer laboratory for the exclusive use of civil engineering students. Software required for all courses and additional software for student inquiry is available. The curriculum is also strengthened by activities of the Norwich student chapters of the American Society of Civil Engineers, Chi Epsilon, Tau Beta Pi, and the Society of American Military Engineers.

### Mission:

The mission of the Civil Engineering Program is:

- Prepare students to excel in civil engineering and related fields.
- Make clear to students that above all else, the Civil Engineering profession is committed to bettering the world.
- Provide fundamental, laboratory-oriented (BSCE level only), hands-on education in the civil engineering field.
- Foster creativity, critical thinking, and problem-solving abilities and motivate students to consider the environmental consequences of their work.
- Enable students to be leaders in their profession, community, nation, and the world.

### Goals:

The Program Educational Objectives of the Civil Engineering Program are to produce graduates who, within two to four years after graduation are able to:

- Lead project teams in their chosen field of Civil Engineering research, design, construction, or management, progressively rising to positions of technical leadership
- Be respected and recognized for technical competence in the creation of solutions that balance sustainability, societal and economic issues.
- Become active citizens in their profession, community, the nation and the world.
- Communicate to both technical and non-technical audiences.
- Actively engage in continuing education throughout life.

### Outcomes:

At the time of graduation, students in the Civil Engineering Program will be expected to have developed and demonstrated an ability to:

1. identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. 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. communicate effectively with a range of audiences
4. 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. function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. acquire and apply new knowledge as needed, using appropriate learning strategies.

### Careers for this Major:

Graduates from this program manage varying job demands and requirements and are capable of adapting to rapidly changing technology. Graduates are also prepared for further formal study in graduate school where a student can specialize in a civil engineering sub-discipline. Whether working for a private engineering firm, construction firm, government agency, or industry, there are many areas in which civil engineers can focus. A few of the major specialties include:

- Structural (buildings, bridges, tunnels)
- Geotechnical (retaining structures, foundations)
- Water and wastewater (water supply, sewage disposal)
- Hydrology (river control, drainage)
- Transportation (highways, airports, railroads)
- Environmental (hazardous waste, air pollution, water quality)

The American Society of Civil Engineers is the largest professional organization that serves Civil and Environmental Engineers, as well as many other types of engineers in associated fields. To learn more about employment opportunities in Civil and Environmental Engineering, please visit: <http://careers.asce.org>.

**Accreditation:**

The Civil Engineering Program is accredited by the Engineering Accreditation Commission (EAC) of ABET,

<http://www.abet.org>, 415 N. Charles Street. Baltimore, MD 21201, Telephone: (410) 347-7700.

**Major****Civil Engineering (B.S.) – Curriculum Map 2020-2021 Catalog**

Course	Cr. Comp.	Course	Cr. Comp.
<b>FRESHMAN</b>			
<b>Fall</b>		<b>Spring</b>	
CH 103 General Chemistry I (General Education Lab Science)	4	CH 104 General Chemistry II (General Education Lab Science)	4
EG 109 Introduction to Engineering I	3	EG 110 Introduction to Engineering II	3
EN 101 Composition and Literature I	3	EN 102 Composition and Literature II	3
MA 121 Calculus I	4	MA 122 Calculus II (General Education Math)	4
General Education Leadership ( <a href="http://catalog.norwich.edu/archives/2020-2021/residentialprograms/catalog/generaleducationgoals/">http://catalog.norwich.edu/archives/2020-2021/residentialprograms/catalog/generaleducationgoals/</a> )	1-3	General Education History/Literature/Arts & Humanities/Social Science ( <a href="http://catalog.norwich.edu/archives/2020-2021/residentialprograms/catalog/generaleducationgoals/">http://catalog.norwich.edu/archives/2020-2021/residentialprograms/catalog/generaleducationgoals/</a> )	3
Fall Semester Total Cr.:	15-17	Spring Semester Total Cr.:	17
<b>SOPHOMORE</b>			
<b>Fall</b>		<b>Spring</b>	
CE 211 Surveying	3	CE 214 Site Development and Engineering	4
CE 264 Specifications and Estimating	1	EG 202 Engineering Mechanics-Dynamics	3
EG 201 Engineering Mechanics-Statics	3	EG 206 Thermodynamics I	3
MA 223 Calculus III (General Education Math)	4	MA 224 Differential Equations	4
PS 211 University Physics I	4	Science Elective *	3
General Education History/Literature/Arts & Humanities/Social Science ( <a href="http://catalog.norwich.edu/archives/2020-2021/residentialprograms/catalog/generaleducationgoals/">http://catalog.norwich.edu/archives/2020-2021/residentialprograms/catalog/generaleducationgoals/</a> )	3		
Fall Semester Total Cr.:	18	Spring Semester Total Cr.:	17
<b>JUNIOR</b>			
<b>Fall</b>		<b>Spring</b>	
EG 350 Engineering Economics and Decision Analysis	3	CE 322 Fluid Mechanics Laboratory	1
CE 321 Materials Laboratory	1	CE 328 Soil Mechanics	4
CE 336 Introduction to Transportation Engineering	3	CE 332 Engineering Hydrology	3
CE 421 Environmental Engineering	4	CE 348 Structural Analysis	3
EG 301 Mechanics of Materials	3	CE 422 Waste and Water Treatment	3
EG 303 Fluid Mechanics	3	EN 204 Professional and Technical Writing	3
Fall Semester Total Cr.:	17	Spring Semester Total Cr.:	17
<b>SENIOR</b>			
<b>Fall</b>		<b>Spring</b>	
CE 419 Foundation Engineering	3	CE 444 Reinforced Concrete Design	3
CE 442 Design of Steel Structures	3	CE 480 Senior Design Project II (Capstone)	3
CE 460 Construction Management	3	General Education History/Literature/Arts & Humanities/Social Science ( <a href="http://catalog.norwich.edu/archives/2020-2021/residentialprograms/catalog/generaleducationgoals/">http://catalog.norwich.edu/archives/2020-2021/residentialprograms/catalog/generaleducationgoals/</a> )	3
CE 479 Senior Design Project I	3	General Education History/Literature/Arts & Humanities/Social Science ( <a href="http://catalog.norwich.edu/archives/2020-2021/residentialprograms/catalog/generaleducationgoals/">http://catalog.norwich.edu/archives/2020-2021/residentialprograms/catalog/generaleducationgoals/</a> )	3
EE 315 Electrical Energy Systems	3	Science Elective *	4
EG 044 Conference	0		
EG 450 Professional Issues (General Education Ethics)	3		

Fall Semester Total Cr.:	18		Spring Semester Total Cr.:	16
TOTAL CREDITS FOR THIS MAJOR: 135-137				

An undergraduate student, who has completed all degree requirements except for attaining a 2.00 average, must take at least 50 percent of all subsequent course work in technical material (subject to approval by the School Director).

All Civil Engineering majors are required to take the Fundamentals of Engineering (F.E.) exam, administered by the State of Vermont or another state, to receive the BSCE degree.

\*Science Electives: BI 101, BI 102, BI 220, BI 205, CH 204, CH 205, CH 327, GL 110, GL 111, GL 156, GL 253, GL 255, GL 257, GL 262, GL 265, ID 110, PS 212. Must include at least one science course that is in an area other than chemistry or physics.