

# BACHELOR OF SCIENCE IN CIVIL ENGINEERING

Civil engineering is the longest-standing engineering disciplines. With an increasing global population, the growing complexity of infrastructure, and changing urban centers, the civil engineer's task is to apply science to the control and utilization of the environment for the total benefit of mankind.

The civil engineer often is confronted with conditions so variable and complex that they cannot be precisely defined by science and mathematics. Therefore, a knowledge of the arts and social sciences, as well as the physical sciences, is essential. In addition, because civil engineering requires overall planning of large projects whose components involve many other disciplines, it is also necessary to have knowledge of project management techniques. Therefore, the civil engineering program provides an education that enables graduates to make far-reaching decisions that draw not only from technical knowledge but also from integrity and judgment.

The objective of the civil engineering program is to prepare graduates to enter and be successful in the civil engineering profession. Graduates are expected to become licensed professional engineers and to reach responsible positions in a wide range of professional settings, including consulting firms, industry, or government. This program will prepare students to begin and successfully complete graduate studies in engineering and/or post-baccalaureate education in a professional degree program. The civil engineering program provides breadth in core sub-disciplines and depth in areas of specialization. This degree program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

In professional courses, classroom lectures are supplemented by laboratory practice, including the study of materials, structural engineering, fluid mechanics and hydraulics, environmental engineering, geotechnical engineering, and surveying. The principal functional areas that are considered sub-divisions of civil engineering are structural engineering, transportation engineering, geotechnical engineering, environmental and water resources engineering, and construction management.

Students may choose a professional specialization as described on the following pages, or one of many approved minors.

Architecture students who plan to pursue a Master of Engineering in Structural Engineering degree should take the following courses:

CAE 303	Steel Structures I	3
CAE 304	Structural Analysis I	3
CAE 307	Concrete Structures I	3
CAE 431	Steel Structures II	3
CAE 432	Concrete Structures II	3

Students should consult the Master of Engineering in Structural Engineering curriculum for additional details.

## Required Courses

Code	Title	Credit Hours
<b>Civil Engineering Requirements</b>		<b>(47)</b>
CAE 100	Introduction to Engineering Drawing and Design	2
CAE 101	Introduction to AutoCAD Drawing and Design	2
CAE 105	Surveying	2
CAE 110	Professional Practice I	1
CAE 111	Professional Practice II	1
CAE 302	Fluid Mechanics	3
CAE 303	Steel Structures I	3
CAE 304	Structural Analysis I	3
CAE 307	Concrete Structures I	3
CAE 312	Engineering Systems Analysis	3
CAE 315	Materials of Construction	3
CAE 323	Introduction to Geotechnical Engineering	3
CAE 419	Introduction to Transportation Engineering and Design	3
CAE 431	Steel Structures II	3
CAE 432	Concrete Structures II	3
CAE 457	Geotechnical Foundation Design	3
CAE 470	Construction Methods and Cost Estimating	3
CAE 496	Fundamentals of Engineering Preparation <sup>1</sup>	0

ENVE 401	Introduction to Water Resources Engineering	3
<b>CAE Technical Electives</b>		<b>(9)</b>
Select 9 credit hours <sup>2</sup>		9
<b>CAE Additional Science Requirement</b>		<b>(3)</b>
ENVE 201	Earth Environ Sci <sup>3</sup>	3
or CAE 221	Engineering Geology	
or BIOL 105	Introduction to Biology	
or PHYS 360	Introduction to Astrophysics	
<b>Mathematics Requirements</b>		<b>(18)</b>
MATH 151	Calculus I	5
MATH 152	Calculus II	5
MATH 251	Multivariate and Vector Calculus	4
MATH 252	Introduction to Differential Equations	4
<b>Physics Requirements</b>		<b>(8)</b>
PHYS 123	General Physics I: Mechanics	4
PHYS 221	General Physics II: Electricity and Magnetism	4
<b>Capstone Design Requirement</b>		<b>(3)</b>
CAE 495	Capstone Senior Design	3
<b>Chemistry Requirement</b>		<b>(4)</b>
CHEM 124	Principles of Chemistry I with Laboratory	4
<b>Computer Science Requirement</b>		<b>(2)</b>
CS 104	Introduction to Computer Programming for Engineers	2
or CS 105	Introduction to Computer Programming	
<b>Engineering Course Requirements</b>		<b>(9)</b>
CAE 286	Theory and Concept of Structural Mechanics	3
CAE 287	Mechanics of Structural Materials	3
MMAE 305	Dynamics	3
<b>Interprofessional Projects (IPRO)</b>		<b>(6)</b>
See Illinois Tech Core Curriculum, section E		6
<b>Humanities and Social Science Requirements</b>		<b>(21)</b>
See Illinois Tech Core Curriculum, sections B and C		21
<b>Total Credit Hours</b>		<b>130</b>

<sup>1</sup> All civil engineering students are required to register for the Fundamentals of Engineering (FE) examination during their senior year. The examination is offered by the National Council of Examiners for Engineering and Surveying (NCEES) throughout the year.

<sup>2</sup> All technical electives must be CAE, ENVE, or EG courses at the 400-level or above. A maximum of one EG course can be used as a CAEE technical elective.

<sup>3</sup> Students are encouraged to take ENVE 201 but other listed additional science electives are acceptable with advisor approval.

## Bachelor of Science in Civil Engineering Curriculum

		Year 1	
Semester 1	Credit Hours	Semester 2	Credit Hours
CAE 100	2	CAE 101	2
CAE 110	1	CAE 111	1
CAE 105	2	MATH 152	5
MATH 151	5	CS 104 or 105	2
CHEM 124	4	PHYS 123	4
Humanities 200-level Course	3	Humanities or Social Sciences Elective	3
<b>17</b>		<b>17</b>	
		Year 2	
Semester 1	Credit Hours	Semester 2	Credit Hours
MATH 251	4	MATH 252	4
CAE 286	3	CAE 287	3
ENVE 201, CAE 221, BIOL 105, or PHYS 360 <sup>1</sup>	3	CAE 302	3
PHYS 221	4	CAE 312	3
Humanities or Social Sciences Elective	3	Humanities or Social Sciences Elective	3
<b>17</b>		<b>16</b>	
		Year 3	
Semester 1	Credit Hours	Semester 2	Credit Hours
CAE 304	3	CAE 303	3
CAE 315	3	CAE 307	3
ENVE 401	3	CAE 323	3
MMAE 305	3	I PRO Elective II	3
I PRO Elective I	3	Humanities or Social Sciences Elective	3
Humanities or Social Sciences Elective	3		
<b>18</b>		<b>15</b>	
		Year 4	
Semester 1	Credit Hours	Semester 2	Credit Hours
CAE 419	3	CAE 495	3
CAE 431	3	CAE 496	0
CAE 432	3	CAEE Technical Elective <sup>2</sup>	3
CAE 457	3	CAEE Technical Elective <sup>2</sup>	3
CAE 470	3	CAEE Technical Elective <sup>2</sup>	3
		Humanities or Social Sciences Elective	3
<b>15</b>		<b>15</b>	

**Total Credit Hours: 130**

<sup>1</sup> Students are encouraged to take ENVE 201 but other listed additional science electives are acceptable with advisor approval.

<sup>2</sup> All technical electives must be CAE, ENVE, or EG courses at the 400-level or above. A maximum of one EG course can be used as a CAEE technical elective.

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## Professional Specializations in Civil Engineering

Students who select an area of specialization must take a minimum of nine credit hours from the following technical electives listed under the respective area of specialization.

Three additional credit hours may be any 400-level CAE course taken with prior approval of the student's adviser and chair.

### Environmental Engineering

Code	Title	Credit Hours
Select a minimum of three courses from the following:		
CAE 439	Introduction to Geographic Information Systems	3
ENVE 402	Introduction to Environmental Engineering and Sustainable Design	3
ENVE 403	Occupational and Environmental Health and Safety	3
ENVE 404	Water and Wastewater Engineering	3
ENVE 444	Carbon Capture, Utilization, and Storage	3
ENVE 463	Introduction to Air Pollution Control	3
<b>Total Credit Hours</b>		<b>9</b>

### Construction Engineering and Management

Code	Title	Credit Hours
CAE 471	Construction Planning and Scheduling	3
CAE 472	Construction Site Operation	3
CAE 473	Construction Contract Administration	3
<b>Total Credit Hours</b>		<b>9</b>

### Geotechnical Engineering

Code	Title	Credit Hours
CAE 401	Hydraulics, Hydrology, and Their Applications	3
CAE 415	Pavement Design, Construction and Maintenance	4
CAE 486	Soil and Site Improvement	3
<b>Total Credit Hours</b>		<b>10</b>

### Structural Engineering

Code	Title	Credit Hours
CAE 411	Structural Analysis II	3
Select a minimum of two courses from the following:		
CAE 408	Bridge and Structural Design	3
CAE 410	Introduction to Wind and Earthquake Engineering	3
CAE 435	Experimental Analysis of Structures	3
CAE 436	Design of Masonry and Timber Structures	3
CAE 437	Homeland Security Concerns in Engineering Systems	3
Other 400- or 500-level courses may be used towards the specialization with the prior approval of the student's adviser.		3
<b>Total Credit Hours</b>		<b>9</b>

### Transportation Engineering

Code	Title	Credit Hours
Select a minimum of three courses from the following:		
CAE 416	Facility Design of Transportation Systems	3
CAE 417	Railroad Engineering and Design	3
CAE 437	Homeland Security Concerns in Engineering Systems	3
CAE 439	Introduction to Geographic Information Systems	3
<b>Total Credit Hours</b>		<b>9</b>