CIVIL ENGINEERING MAJOR (IN-PERSON OR ONLINE)

Department: Civil Engineering and Construction (https://catalog.bradley.edu/undergraduate/engineering-technology/civil-engineering/)

The baccalaureate program in civil engineering is accredited by the Engineering Accreditation Commission of ABET, https://www.abet.org (https://www.abet.org/).

Civil Engineering Mission and Objectives

Produce graduates who possess a keen awareness of the global dimensions of our profession, leadership skills required to serve our society, and the technical knowledge to pursue multiple career paths, including advanced degrees. To achieve our mission, our department will strive to achieve the following civil engineering program objectives:

1. Our alumni serve as leaders and stewards in their profession and society by working collaboratively to encourage innovation, enhance infrastructure solutions, support entrepreneurial initiatives, and / or contribute to public policy.
2. Our alumni apply ethics and sustainable development principles in their profession, commit to life-long learning, earn licensure, and become experts and mentors in their profession.
3. Our alumni possess the technical proficiency, mindset, and communication skills that enable them to effectively engage in interdisciplinary and culturally diverse teams and thrive in their careers.

Student Outcomes

In order to meet these program educational objectives, students graduating from Bradley's civil engineering program will attain the following outcomes.

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 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

The Department of Civil Engineering and Construction offers an ABET-accredited BSCE program that provides students with the necessary background for continued professional growth and prepares them for engineering careers. The program offers a broad spectrum of courses including structural engineering, water resources, environmental engineering, sustainability, transportation engineering, pavement design, geotechnical engineering, and construction management. The curriculum is designed to give students the broad technical background required for modern civil engineering practice and/or to pursue higher education. Students are trained to be leaders who understand their critical roles in the development of sustainability and maintenance of society's infrastructure.

The program is founded on a strong core in mathematics as well as natural and engineering sciences. Design practices in civil engineering are integrated throughout the curriculum, culminating in a two-semester capstone design course sequence under the supervision of well-qualified faculty and industrial partners. A sequence of courses in the humanities and social sciences help students understand the impact of engineering solutions on society and are chosen to meet Bradley Core Curriculum requirements. The curriculum gives students flexibility in selecting electives while meeting all accreditation requirements.

The listed courses, an expected total of **123 hours**, must be completed to meet degree requirements and to earn a Bachelor of Science in Civil Engineering (BSCE). The Civil Engineering curriculum consists of:

Code	Title	Hours
Bradley Core Curriculum (BCC)		
BCC Communications Oral Communications (BCC – CM)		
COM 103	The Oral Communication Process	3.0
BCC Communications Writing (BCC – W1)		
ENG 101	English Composition	3.0
BCC Communications Advanced Writing (BCC – W2)		3.0
BCC Fine Arts (BCC – FA)		3.0
BCC Global Perspectives (BCC – GP)		3.0
BCC Humanities (BCC – HU)		3.0
BCC Multidisciplinary Integration (BCC – MI)		3.0
BCC Social and Behavioral Sciences (BCC – SB)		3.0
Mathematics and Basic Sciences		
CHM 110	General Chemistry I (BCC-NS1)	3.0
CHM 111	General Chemistry I Lab	1.0
C E 210	Numerical Methods in Civil Engineering	3.0
C E 310	Probability, Statistics and Decision Making in Civil Engineering	3.0
MTH 121	Calculus I	4.0
MTH 122	Calculus II	4.0
MTH 223	Calculus III	4.0
MTH 224	Elementary Differential Equations	3.0
PHY 110	University Physics I	4.0
Basic Science Elective (choose one):		**3.0**
Any biology course		
Any astronomy course		
Any geological science course		
Any environmental science course		
Any computer science course, excluding courses devoted primarily to learning a computer language		
Any data science course, excluding courses devoted primarily to learning a computer language		
Required Courses		

C E 100	Introduction to Civil Engineering	1.0
C E 150	Statics	3.0
C E 224	CADD	3.0
C E 250	Dynamics	3.0
C E 260	Fluid Mechanics	2.0
C E 261	Fluid Mechanics Lab	1.0
C E 270	Mechanics of Materials	3.0
C E 350	Geotechnical Engineering	3.0
C E 356	Pavement Design	3.0
C E 359	Structural Analysis	4.0
C E 360	Introduction to Environmental Engineering	3.0
C E 361	Environmental Engineering Lab	1.0
C E 365	Reinforced Concrete Design	3.0
C E 380	Civil Engineering Materials	2.0
C E 394	Sustainable Infrastructure & Ethics	3.0
C E 480	Transportation Engineering	3.0
C E 493	Civil Engineering Design Project I (EL, WI)	3.0
C E 498	Civil Engineering Design Project II (EL, WI)	3.0
CON 132	Construction Graphics	2.0
CON 326	Construction Estimating	3.0
C E Elective Courses (6 hours) [1]		**6.0**
CON 206	Surveying	
C E 422	Foundation Analysis and Design	
C E 430	Water Supply & Hydraulic Engineering	
C E 442	Design of Steel Structures	
C E 465	Surface Water Hydrology	
C E 491	Special Topics I	
C E 492	Special Topics II	
C E 508	Advanced Soil Mechanics	
C E 515	Advanced Foundation Engineering	
C E 520	Advanced Numerical Methods	
C E 541	Pollution Modeling	
C E 542	Advanced Water Treatment	
C E 543	Advanced Wastewater Treatment	
C E 546	Groundwater Hydrology	
C E 555	Sustainability and Environmental Regulations	
C E 558	Solid Waste Management	
C E 560	Advanced Structural Analysis	
C E 562	Advanced Steel Design	
C E 565	Advanced Concrete Design	
C E 567	Prestressed Concrete Design	
C E 570	Advanced Mechanics of Materials	
C E 575	Structural Dynamics	
C E 577	Seismic Design	
C E 580	Highway Safety	
C E 582	Traffic Flow Theory	
C E 583	Geometric Highway Design	
C E 584	Urban Transportation Planning	
C E 585	Pavement Management Systems	
C E 586	Advanced Pavement Design	
C E 587	Traffic Signal Design	
C E 588	Transportation Economics	
C E 591	Advanced Topics I	
C E 592	Advanced Topics II	
C E 593	Advanced Project I	
C E 594	Advanced Project II	
Technical Elective Courses (select 9 hours): [1]		**9.0**
Any CE Elective course listed above		
CON 262	Mechanical and Electrical Systems I	
CON 270	Construction Materials and Methods I	
CON 272	Construction Materials and Methods II	
CON 330	Housing	
CON 342	Construction Equipment	
CON 352	Sustainable Urban Environment	
CON 356	Construction Safety	
CON 368	Mechanical and Electrical Systems II	
CON 372	Construction Methods Improvements	
CON 388	Contract Administration	
CON 392	Construction Scheduling	
CON 394	Construction Labor and Unions	
CON 430	Commercial Construction	
CON 435	Heavy and Highway Construction	
CON 452	Green Construction and LEED	
CON 492	Construction Project Controls	
CON 494	Construction Practice	
CON 520	Advanced Construction Practice	
CON 522	Advanced CADD	
CON 524	Building Information Modeling	
CON 526	Advanced Construction Estimating	
CON 528	Advanced Construction Scheduling	
CON 529	Advanced Construction Contracts	
CON 536	TQM Principles	
CON 537	Construction Simulation	
CON 540	Project and Company Management	
CON 591	Advanced Topics I	
CON 592	Advanced Topics II	
CON 593	Advanced Project I	
CON 594	Advanced Project II	
M E 301	Thermodynamics I	
M E 302	Thermodynamics II	
M E 521	Intermediate Fluid Mechanics	
M E 536	Industrial Pollution Prevention	
M E 537	Building Energy Management	
M E 556	Mechanics of Composite Materials	
M E 577	Finite Element Methods in Engineering	
IME 301	Engineering Economy I	
IME 313	Operations Research I	
ECE 227	Electrical Engineering Fundamentals	
Any BUS, BSA, ATG, ECO, BLW, BMA, ENT, MIS, FIN, ML, MTG, or IB course		
Any computer science course above CS 210		
Any biology course		
Any astronomy course		
Any geological science course		

Any environmental science course	
Any mathematics course above MTH 224	
Any physics course above PHY 110	
Any chemistry course above CHM 110	
Total Hours	**123**

[1] All electives selected by the student should be approved by the student's academic advisor. The student should select technical electives that reflect career objectives. Students wishing to enroll in a CEC graduate-level course (500) must have a minimum 2.75 GPA overall.

Internship Options

With support from the Bradley University Smith Career Center, students are strongly encouraged to engage in at least one internship by the time they are ready to graduate. Internships are managed by the Smith Career Center through one of the following courses, which can be taken during the summer session right before the associated class year.

Code	Title	Hours
EGT 210	Sophomore Engineering Internship (Bradley Core: EL)	0.0
EGT 310	Junior Engineering Internship (Bradley Core: EL)	0.0
EGT 410	Senior Engineering Internship (Bradley Core: EL)	0.0