

CIVIL ENGINEERING, B.S. (ENGINEERING)

Begin Campus: Any Penn State Campus

End Campus: University Park

Program Description

The program in Civil and Environmental Engineering is designed to provide the basic undergraduate education required for private practice and public service in civil engineering and/or continue formal education. Emphasis is placed on the fundamentals of civil engineering principles and design techniques. Students utilize basic engineering science concepts in several of the different specialty areas (e.g., construction/management, environmental, materials/pavement design/geotechnical, structures, transportation, and water resources). Finally the students are able to choose an area of specialization for professional practice or graduate studies.

The program is broadened by courses in communication, arts, humanities, social and behavioral sciences, as well as other engineering disciplines. Students gain experience in working as members of a team and using interdisciplinary approaches to solve problems. These experiences, as well as those related to engineering principles and design, are provided through exercises in the classroom, laboratory, and field. The program culmination is a capstone design course wherein the students' knowledge and skills are applied to actual engineering problems.

What is Civil Engineering?

The Bachelor of Science in Civil Engineering's mission is to educate future engineers through solid science and engineering principles. We seek to identify engineering challenges, create pioneering solutions, and lead the industry with our research discoveries and design innovations. With eight research facilities and six research centers and units, we tackle some of the major problems facing engineering today, challenging existing knowledge in an effort to advance the fields of civil and environmental engineering. We offer a diverse range of undergraduate and graduate degree programs focusing on environmental engineering, geotechnical and materials engineering, structural engineering and mechanics, transportation engineering, and water resources engineering.

You Might Like This Program If...

Our students are trained to solve the design, construction, and maintenance concerns of the natural and physically built environment. They deal with public works including highways, railroads, bridges, buildings, and water and energy systems. You might like this major if you want to tackle some of the major problems facing engineering today and lead the industry in research discoveries and design innovations. Our graduates are responsible for designing, building, and maintaining all of the structures that surround us—from buildings to transportation systems to water—in order to improve the needs of society.

Entrance to Major

This program currently has administrative enrollment controls. Administrative Enrollment Controls are initiated when limitations of space, faculty, or other resources in a major prevent accommodating all students who request them. Students must follow the administrative

enrollment controls that are in effect for the semester that they enter the university.

First-Year Students Entering Summer 2018, Fall 2018, Spring 2019

In order to be eligible for entrance to this major, students must satisfy the following requirements:

- completed 40-59 credits at Penn State (actual credits taken at the University)
- completed with a grade of C or better: CHEM 110, MATH 140, MATH 141, MATH 250 or MATH 251, PHYS 211, and PHYS 212
- earned a minimum of 2.60 cumulative GPA

Students Who Entered Prior to Summer 2018

Students who entered the University prior to the summer 2018 semester should view the administrative enrollment controls for the semester that they entered the university (<http://advising.psu.edu/entrance-major-requirements>) on the Academic Advising Portal.

Degree Requirements

For the Bachelor of Science degree in Civil Engineering, a minimum of 127 credits is required:

Requirement	Credits
General Education	45
Requirements for the Major	112

General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (<http://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program>) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required.)

- **Quantification (GQ):** 6 credits
- **Writing and Speaking (GWS):** 9 credits

Knowledge Domains

- **Arts (GA):** 6 credits
- **Health and Wellness (GHW):** 3 credits
- **Humanities (GH):** 6 credits
- **Social and Behavioral Sciences (GS):** 6 credits
- **Natural Sciences (GN):** 9 credits

Integrative Studies (may also complete a Knowledge Domain requirement)

- **Inter-Domain or Approved Linked Courses:** 6 credits

27 of these 45 credits are included in the Requirements for the Major.

University Degree Requirements

First Year Engagement

All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement

6 credits are required and may satisfy other requirements

- United States Cultures: 3 credits
- International Cultures: 3 credits

Writing Across the Curriculum

3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits

A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work

Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition

The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80>)). For more information, check the Suggested Academic Plan for your intended program.

Requirements for the Major

This includes 27 credits of General Education courses: 9 credits of GN courses; 6 credits of GQ courses; 3 credits of GS courses; 9 credits of GWS courses.

To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44>).

Code	Title	Credits
Prescribed Courses		
CHEM 111	Experimental Chemistry I	1
EDSGN 100	Introduction to Engineering Design	3
STAT 401	Experimental Methods	3
GEOSC 1	Physical Geology	3
MATH 220	Matrices	2

ENGL 202C	Effective Writing: Technical Writing	3
<i>Prescribed Courses: Require a grade of C or better</i>		
CHEM 110	Chemical Principles I	3
EMCH 211	Statics	3
MATH 140	Calculus With Analytic Geometry I	4
MATH 141	Calculus with Analytic Geometry II	4
PHYS 211	General Physics: Mechanics	4
EMCH 212	Dynamics	3
EMCH 213	Strength of Materials	3
MATH 251	Ordinary and Partial Differential Equations	4
PHYS 212	General Physics: Electricity and Magnetism	4
CE 310	Surveying	3
CE 321	Highway Engineering	3
CE 332	Professionalism, Economics & Construction Project Delivery	3
CE 335	Engineering Mechanics of Soils	3
CE 336	Materials Science for Civil Engineers	3
CE 340	Structural Analysis	3
CE 360	Fluid Mechanics	3
CE 370	Introduction to Environmental Engineering	3
Additional Courses		
CE 100S	Topics and Contemporary Issues in Civil and Environmental Engineering: First-Year Seminar (or 1 credit of First-Year Seminar or elective)	1
ENGL 15	Rhetoric and Composition	3
or ENGL 30	Honors Freshman Composition	
CAS 100A	Effective Speech	3
or CAS 100B	Effective Speech	
CMPSC 200	Programming for Engineers with MATLAB	3
or CMPSC 201	Programming for Engineers with C++	
Select one of the following:		3
ECON 102	Introductory Microeconomic Analysis and Policy	
ECON 104	Introductory Macroeconomic Analysis and Policy	
ECON 14	Principles of Economics	
CHE 220	Introduction to Chemical Engineering Thermodynamics ¹	3
or ME 201	Introduction to Thermal Science	
CE 475	Water Quality Chemistry ²	4
or CE 337	Civil Engineering Materials Laboratory	
Select 9 credits of the following: ³		9
CE 341	Design of Concrete Structures	
CE 342	Design of Steel Structures	
CE 371	Water and Wastewater Treatment	
CE 422	Transportation Planning	
CE 423	Traffic Operations	
CE 432	Construction Project Management	
CE 435	Foundation Engineering	
CE 436	Construction Engineering Materials	
CE 437	Engineering Materials for Sustainability	
CE 441	Structural Design of Foundations	
CE 447	Structural Analysis by Matrix Methods	
CE 461	Water-resource Engineering	
CE 462	Open Channel Hydraulics	

CE 475	Water Quality Chemistry	
CE 476	Solid and Hazardous Wastes	
CE 479	Environmental Microbiology for Engineers	
Select 3 credits of CE 400 level "W" courses		3

Supporting Courses and Related Areas

Select 9 credits of technical elective from CE 300-level courses, CE 400-level courses, or department list		9
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- Students may substitute 6 credits of ROTC for 3 credits of GHW courses and 3 credits of ME.
- If CE 475 is taken, one credit goes toward lab requirement and remaining three go towards CE or general technical electives.
- Two of those courses must be selected from at least 2 of the 3 remaining technical areas in the Civil Engineering program—structures (x40), hydrosystems (x60), and environmental (x70).

Program Educational Objectives

The educational objectives of our undergraduate program will prepare our graduates to:

- begin and sustain a career in consulting, industry, or state and federal government agencies, such as the departments of transportation and departments of environmental protection;
- lead and work in interdisciplinary teams needed to design sustainable and resilient infrastructure through knowledge and application of environmental, geotechnical, materials, structural, transportation, and water resources engineering;
- engage in life-long learning opportunities, including graduate school; and
- obtain and maintain professional licensure

Program Outcomes (Student Outcomes)

The undergraduate program will provide students with:

- an ability to apply knowledge of mathematics, science, and engineering;
- an ability to design and conduct experiments, as well as to analyze and interpret data;
- an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
- an ability to function on multidisciplinary teams;
- an ability to identify, formulate, and solve engineering problems;
- an understanding of professional and ethical responsibility;
- an ability to communicate effectively;
- an understanding of the impact of engineering solutions in a global, economic, environmental, and societal context;
- a recognition of the need for, and an ability to engage in, life-long learning;
- knowledge of contemporary issues in civil engineering;
- an ability to use modern engineering techniques, skills, and tools necessary for engineering practice.

Academic Advising

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their

intellectual discovery, and to encourage students to take advantage of both in-and-out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information need to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (<http://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy>)

University Park

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Suggested Academic Plan

All Civil Engineering Disciplines - Ending at University Park Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

If you are starting at a campus other than the one this plan is ending at, please refer here:

<http://advising.engr.psu.edu/degree-requirements/academic-plans-by-major.aspx>

First Year

Fall	Credits Spring	Credits
CE 100S (or other First Year Seminar) [†]	1 CHEM 111	1
CHEM 110 (GN) ^{*#†}	3 ENGL 15, 30, or ESL 15 (GWS) ^{††}	3
ECON 102 or 104 (GS) [†]	3 MATH 141 or 141E (GQ) ^{*†#†}	4
EDSGN 100	3 PHYS 211 (PHYS 211L and PHYS 211R (GN)) ^{*#†}	4
MATH 140 or 140E (GQ) ^{*†#†}	4 General Education Course [†]	3
General Education Course [†]	3 General Education Course (GHW) [†]	1.5
	17	16.5

Second Year

Fall	Credits Spring	Credits
CAS 100A or 100B (GWS) ^{††}	3 CMPSC 200 or 201	3
EMCH 211 [*]	3 EMCH 212 [*]	3
GEOSC 1	3 EMCH 213 or 213D [*]	3
MATH 251 ^{*#}	4 IE 424 or STAT 401	3

PHYS 212 (PHYS 212L and PHYS 212R (GN)) ^{*,#†}	4 MATH 220	2
General Education Course [†]		3
		17

Third Year

Fall	Credits Spring	Credits
CE 310 [*]	3 CE 321 [*]	3
CE 332 [*]	3 CE 335 [*]	3
CE 336 [*]	3 CE 337 [*]	1
CE 340 [*]	3 CE 370 [*]	3
CE 360 [*]	3 ME 201	3
General Education Course (GHW) [†]	1.5	
		13
		16.5

Fourth Year

Fall	Credits Spring	Credits
ENGL 202C (GWS) ^{††}	3 Civil Engineering Capstone Design	3
Civil Engineering Elective	3 Civil Engineering Elective	3
Civil Engineering Elective	3 Technical Elective	3
Technical Elective	3 Technical Elective	3
General Education Course [†]	3 General Education Course [†]	3
		15

Total Credits 127

* Course requires a grade of C or better for the major

‡ Course requires a grade of C or better for General Education

Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of 'C' or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

All incoming Schreyer Honors College first-year students at University Park will take ENGL/CAS 137 in the fall semester and ENGL/CAS 138 in the spring semester. These courses carry the GWS designation and replace both ENGL 30 and CAS 100. Each course is 3 credits.

College Note

C E Elective: C E Electives must be selected from two of three remaining technical areas in the program: Structures (X40); Water Resources Engineering (X60); Environmental Engineering (X70).

Health and Physical Activity Elective: Students who complete the ROTC Program may substitute 3 ROTC credits for the GHW requirement and 3 ROTC credits for M E 201.

Technical Elective: Select from department list. Students who complete the Cooperative Education Program may substitute the 3-credit sequence of ENGR 295, ENGR 395, and ENGR 495 for a Technical Elective.

** If a student is pursuing the Structural sub-discipline in Civil Engineering, if CE 340 is not taken in the 5th semester it may delay graduation.

Career Paths

Our graduates work in a variety of fields to develop solutions for challenges in design, construction, research, and education. Civil engineering graduates work in the public sector for government agencies or in the private sector at consulting or construction firms. Some civil engineers hold supervisory or administrative positions, while others pursue careers in design, construction, or education.

Opportunities for Graduate Studies

Our graduate degree programs give students a stronger foundation in civil or environmental engineering that helps prepare them to apply their skills across a broad range of disciplines in both academia and industry. If you wish to develop and expand your expertise, you will have ample opportunity to do so here. Our first-rate faculty collectively possess a deep and broad range of knowledge that provides an ideal environment for interdisciplinary work. Whether your passion calls you to start your own business, pursue the next ground-breaking innovation, or help solve a humanitarian crisis, our graduate degree programs can take you closer to your goals.

Professional Resources

- American Society of Civil Engineers (<http://www.asce.org>)

Accreditation

The baccalaureate program in Civil Engineering is accredited by the Engineering Accreditation Commission of ABET, www.abet.org (<http://www.abet.org>).

MORE INFORMATION (<http://www.abet.org>)

Contact**University Park**

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