

# CIVIL ENGINEERING, B.S. (CAPITAL)

**Begin Campus:** Any Penn State Campus

**End Campus:** Harrisburg

## 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?

Civil engineering is one of the oldest and most socially-relevant engineering disciplines. Grounded in mathematics and science, civil engineers make a lasting impact as they plan, design, construct, operate, and maintain the everyday, yet critical, infrastructure systems needed in our daily lives. In this challenging and diverse field, civil engineers also find solutions for critical environmental issues, including slowing the progress and mitigating the effects of climate change, eliminating the causes and treating the effects of environmental pollutants, and providing access to clean water. In recent years, the rapid application of new technologies has fostered the development of autonomous vehicles, 3D printing, smart structures, advanced materials, and new forms of renewable energy.

## You Might Like This Program If...

- You want to design and build large-scale projects that last a long time.
- You care about the quality of the water that comes out of the faucet.
- You are interested in the operations and safety of future transportation systems.
- You try to find sustainable solutions for every challenge, big or small.
- You would like to use your technical skills in an exciting, people-serving profession.

## Entrance to Major

In order to be eligible for entrance to this major, students must satisfy the following requirements by the end of the semester during which the admission to major process is carried out.

- Completed 29-55 cumulative credits (credits completed at Penn State for which a quality letter grade was earned)
- Completed with a C or better the following courses: EDSGN 100, CHEM 110, MATH 140, MATH 141, and PHYS 211
- Attained at least a 2.6 cumulative grade point average

\* In the event that the major is under enrollment control, a higher minimum cumulative grade-point average is likely to be needed and students must be enrolled in the College of Engineering or Division of Undergraduate Studies at the time of confirming their major choice.

## 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	109

**27 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 9 credits of GN courses; 6 credits of GQ courses; 3 credits of GS courses; 9 credits of GWS courses.**

## Requirements for the Major

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 (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44>).

Code	Title	Credits
<b>Prescribed Courses</b>		
CHEM 111	Experimental Chemistry I	1
GEOSC 1	Physical Geology	3
MATH 220	Matrices	2
STAT 401	Experimental Methods	3
<i>Prescribed Courses: Require a grade of C or better</i>		
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
CHEM 110	Chemical Principles I	3
EDSGN 100	Cornerstone Engineering Design	3
EMCH 211	Statics	3
EMCH 212	Dynamics	3
EMCH 213	Strength of Materials	3
ENGL 202C	Effective Writing: Technical Writing	3
MATH 140	Calculus With Analytic Geometry I	4
MATH 141	Calculus with Analytic Geometry II	4
MATH 251	Ordinary and Partial Differential Equations	4
PHYS 211	General Physics: Mechanics	4

PHYS 212	General Physics: Electricity and Magnetism	4
<b>Additional Courses</b>		
CE 337	Civil Engineering Materials Laboratory <sup>1</sup>	1
or CE 475	Water Quality Chemistry	
CHE 220	Introduction to Chemical Engineering Thermodynamics <sup>2</sup>	3
or ME 201	Introduction to Thermal Science	
CMPSC 200	Programming for Engineers with MATLAB	3
or CMPSC 201	Programming for Engineers with C++	
Select one of the following:		1
CE 100S	Topics and Contemporary Issues in Civil and Environmental Engineering: First-Year Seminar	
1 credit of First-Year Seminar or Elective		
Select one of the following:		3
ECON 14	Principles of Economics	
ECON 102	Introductory Microeconomic Analysis and Policy	
ECON 104	Introductory Macroeconomic Analysis and Policy	
Select 6 credits of the following: <sup>3</sup>		6
CE 341	Design of Concrete Structures	
CE 342	Design of Steel Structures	
CE 371	Water and Wastewater Treatment	
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
<i>Additional Courses: Require a grade of C or better</i>		
CAS 100A	Effective Speech	3
or CAS 100B	Effective Speech	
ENGL 15	Rhetoric and Composition	3
or ENGL 30H	Honors Rhetoric and Composition	
<b>Supporting Courses and Related Areas</b>		
Select 12 credits of technical elective from CE 300-level courses, CE 400-level courses, or department list		12

<sup>1</sup> If CE 475 is taken, one credit goes toward lab requirement and remaining three go towards CE or general technical electives.

<sup>2</sup> Students may substitute 6 credits of ROTC for 3 credits of GHW courses and 3 credits of ME.

<sup>3</sup> 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).

## 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 (<https://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 and Inter-Domain courses do not meet this requirement.)

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

### Breadth in the Knowledge Domains (Inter-Domain courses do not meet this requirement.)

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

### Integrative Studies

- **Inter-Domain Courses (Inter-Domain):** 6 credits

### Exploration

- **GN**, may be completed with Inter-Domain courses: 3 credits
- **GA, GH, GN, GS, Inter-Domain courses.** This may include 3 credits of World Language course work beyond the 12th credit level or the requirements for the student's degree program, whichever is higher: 6 credits

## 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 (<https://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.

## Integrated B.S. in Civil Engineering and M.S. in Civil Engineering

*Available at the following campuses: Harrisburg*

Requirements for the Integrated B.S. in Civil Engineering and M.S. in Civil Engineering can be found in the Graduate Bulletin (<https://bulletins.psu.edu/graduate/programs/majors/civil-engineering-capital/#integratedundergradgradprogramstext>).

## Integrated B.S. in Civil Engineering and M.Eng. in Environmental Engineering

*Available at the following campuses: Harrisburg*

Requirements for the Integrated B.S. in Civil Engineering and M.Eng. in Environmental Engineering can be found in the Graduate Bulletin (<https://bulletins.psu.edu/graduate/>).

## Program Educational Objectives

The Program Educational Objectives are designed so that the graduates from the Civil Engineering program at Penn State Harrisburg will:

- Have skills needed to be engaged with industries or government agencies that design, construct, and maintain civil engineering infrastructures.
- Effectively work in and/or lead interdisciplinary teams in addressing multiple facets of sustainable and resilient civil engineering.
- Have the ability to advance knowledge through professional development and educational opportunities as well as obtain and maintain professional licensing.

## Program Outcomes (Student Outcomes)

The students from the Civil Engineering Program at Penn State Harrisburg 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 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 and inclusive 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.

## 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 needed to plan the chosen program of study, and referrals to other specialized resources.

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

### Harrisburg

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## Suggested Academic Plan

The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2023-24 academic year. To access previous years' suggested academic plans, please visit the archive (<https://bulletins.psu.edu/undergraduate/archive/>) to view the appropriate Undergraduate Bulletin edition (*Note: the archive only contains suggested academic plans beginning with the 2018-19 edition of the Undergraduate Bulletin*).

### Civil Engineering, B.S. at Harrisburg 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.

### First Year

Fall	Credits Spring	Credits
ENGL 15, 15S, 30T, or ESL 15 <sup>‡</sup>	3 General Education Course	3
EDSGN 100 or 100S	3 ECON 102 or 104 <sup>†</sup>	3
CHEM 110 <sup>*#†</sup>	3 CAS 100A or 100S <sup>‡</sup>	3
CHEM 111 <sup>†</sup>	1 MATH 141 <sup>*#†</sup>	4
MATH 140 <sup>*#†</sup>	4 PHYS 211 <sup>*#†</sup>	4
CE 100S	1	
	<b>15</b>	<b>17</b>

### Second Year

Fall	Credits Spring	Credits
General Education Course	3 General Education Course	3
GEOSC 1	3 CMPSC 121, 200, or 201	3
EMCH 211 <sup>*</sup>	3 EMCH 212 <sup>*</sup>	3
PHYS 212 <sup>*</sup>	4 EMCH 213 <sup>*</sup>	3
MATH 251 <sup>*</sup>	4 MATH 220	2
	STAT 401	3
	<b>17</b>	<b>17</b>

### Third Year

Fall	Credits Spring	Credits
CE 310 <sup>*</sup>	3 CE 321 <sup>*</sup>	3
CE 336 <sup>*</sup>	3 CE 370 <sup>*</sup>	3
CE 337	1 CE 335 <sup>*</sup>	3
CE 340 <sup>*</sup>	3 ME 201	3
CE 332 <sup>*</sup>	3 Civil Engineering Elective	3
CE 360 <sup>*</sup>	3 General Education Course (GHW)	1.5
	<b>16</b>	<b>16.5</b>

### Fourth Year

Fall	Credits Spring	Credits
ENGL 202C <sup>‡</sup>	3 CE 4XXW Capstone Design	3
General Education Course	3 Technical Elective	3
Civil Engineering Elective	3 Technical Elective	3
Technical Elective	3 General Education Course	3
Technical Elective	3 General Education Course (GHW)	1.5
	<b>15</b>	<b>13.5</b>

### 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 Cultural Diversity 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.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

### Program Notes

- Graduation in this major requires a minimum of 127 total credits.
- **Civil Engineering Elective:** CE Electives must be selected from two of these specific technical areas in the program: Structures; Water Resources Engineering; Environmental Engineering.
- **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 ME 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.
- \*\*\* Environmental and water resources students may substitute 1 credit of CE 475 for CE 337.

## Career Paths

Civil engineers are responsible for designing, building, and maintaining the critical systems that support society and protect the environment. Graduates of the civil engineering program are prepared to be innovative leaders in a diverse range of industries. Students are routinely recruited for positions in the public sector with government agencies or in the private sector at consulting firms or construction companies. Students may also choose to continue their formal education by pursuing advanced degrees, and many remain in academia upon graduation.

## Careers

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.

MORE INFORMATION ABOUT POTENTIAL CAREER OPTIONS FOR GRADUATES OF THE CIVIL ENGINEERING PROGRAM (<https://www.asce.org/career-growth/>)

CAREER RESOURCES FOR CIVIL ENGINEERING STUDENTS (<https://www.cee.psu.edu/academics/resources/career-resources.aspx>)

## Opportunities for Graduate Studies

In our graduate programs, students learn in the classroom and the laboratory, finding a broad network of mentors and collaborators. After graduation, many career options await.

- The one-year Master of Engineering (M.Eng.) (<https://www.cee.psu.edu/academics/graduate/degrees-and->

requirements.aspx#MEng) program gives you a strong foundation and leads to advanced professional practice.

- The Master of Science (M.S.) (<https://www.cee.psu.edu/academics/graduate/degrees-and-requirements.aspx#MS>) program blends advanced coursework and research, producing highly sought-after graduates.
- The Doctor of Philosophy (Ph.D.) (<https://www.cee.psu.edu/academics/graduate/degrees-and-requirements.aspx#PhD>) program provides a comprehensive educational and research opportunity, challenging students to be leaders of their fields.

What could you achieve with an advanced degree from the Department of Civil and Environmental Engineering at Penn State?

MORE INFORMATION ABOUT OPPORTUNITIES FOR GRADUATE STUDIES (<https://www.cee.psu.edu/academics/graduate/>)  
GRADUATE DEGREES AND REQUIREMENTS (<https://www.cee.psu.edu/academics/graduate/degrees-and-requirements.aspx>)

## Professional Resources

- American Concrete Institute (<https://www.concrete.org/>)
- American Society of Civil Engineers (<https://www.asce.org>)
- PSU Civil and Environmental Engineering Professional Organization Student Chapter List (<https://www.cee.psu.edu/academics/resources/student-organizations.aspx>)

## Accreditation

The Bachelor of Science in Civil Engineering at Penn State Harrisburg is accredited by the Engineering Accreditation Commission of ABET, <https://www.abet.org>, under the General Criteria and the Civil Engineering Program Criteria.

## Professional Licensure/Certification

Many U.S. states and territories require professional licensure/certification to be employed. If you plan to pursue employment in a licensed profession after completing this program, please visit the Professional Licensure/Certification Disclosures by State (<https://www.psu.edu/state-licensure-disclosures/>) interactive map.

## Contact

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