

CIVIL ENGINEERING, BACHELOR OF SCIENCE

Bachelor of Science in Civil Engineering

The Department of Civil and Systems Engineering offers an undergraduate degree program in civil engineering that strives to educate intellectual leaders of the profession by instilling in them a fundamental understanding of the mathematical and physical principles that underlie the science of our discipline, the skills necessary to engage in the challenges of creative engineering design, and a sense of responsibility for professional service.

Civil Engineering is a broad field with many subdisciplines. While the curriculum at Johns Hopkins prepares students for industry or academic work in any of these subdisciplines, it focuses on graduating students who are aware of and ready to tackle society's most pressing challenges - those related to resilient cities, future energy infrastructure, human safety and security, decision-making for healthcare, and space exploration and habitation.

Students are prepared to meet these challenges not only through coursework in traditional civil engineering areas (e.g. geotechnical engineering and structural engineering), but also through a curriculum which emphasizes the use of data for making decisions about our infrastructure systems (e.g. energy and transportation). Beyond coursework, many of our undergraduate students elect to do research in one of these areas with a faculty member.

Combined Bachelor's/Master's Programs

The Department of Civil and Systems Engineering offers two options for earning a combined bachelor's/master's degree.

One option combines a **B.S. in Civil Engineering** with a **Master of Science in Engineering (M.S.E.) in Civil Engineering** or a **Master of Science (M.S.) in Systems Engineering**. For students who are admitted to this program, the two degrees typically require five years total to complete. Students who enroll in the combined Bachelor's/Master's program or pursue a master's degree after having earned the B.S. in Civil Engineering at Hopkins may double-count one advanced course (400-level or higher) towards both the bachelor's and master's degrees with the permission of the master's faculty advisor. More detail on double-counting courses can be found here (<https://engineering.jhu.edu/education/graduate-studies/graduate-academic-policies-procedures/>).

The other option combines a **B.S. in Civil Engineering** with a **Master of Science in Engineering Management (M.S.E.M.)**. Students are required to submit a formal application through the M.S.E.M. Program (<http://msem.engineering.jhu.edu/>).

Students enrolled in either the B.S./M.S.E., B.S./M.S. or B.S./M.S.E.M program are awarded a Dean's Master's Fellowship, covering half their tuition, after they have completed eight semesters of undergraduate study. More information about these programs can be found at the website.

The information below describes the academic requirements for students entering JHU as degree-seeking students in Fall 2024. Students who entered JHU as degree-seeking students prior to Fall 2024 should view the appropriate archived catalogue (<https://e-catalogue.jhu.edu/archive/>).

Students must meet the University requirements and the Whiting School of Engineering requirements (see Requirements for a Bachelor's Degree (<https://e-catalogue.jhu.edu/ksas-wse/undergraduate-policies/academic-policies/requirements-bachelors-degree/>) in this catalogue), as well as the departmental major requirements, to complete a bachelor's degree.

The Bachelor of Science degree in Civil Engineering requires 125 credits.

The Department of Civil and Systems Engineering recognizes students with exemplary academic records by awarding Departmental Honors to students with a Grade Point Average of 3.75 GPA or higher in major-specific courses.

UNIVERSITY AND WSE SCHOOL REQUIREMENTS

These requirements are described in this section of the catalogue (<https://e-catalogue.jhu.edu/ksas-wse/undergraduate-policies/academic-policies/requirements-bachelors-degree/>).

First-Year Seminar (FYS)

All students entering Hopkins from high school are required to complete a First-Year Seminar with a Satisfactory (S) grade in their first year of study. First-Year Seminars are offered only with the Satisfactory/Unsatisfactory grading system; they are not offered for letter grades.

Code	Title	Credits
One FYS course. Recommended course:		2-3
EN.501.124	FYS: Design Cornerstone	
<i>Total Credits</i>		2-3

Writing Intensive for BS in Civil Engineering

A grade of C- or higher is required. No Satisfactory/Unsatisfactory grades will be accepted. Courses must be at least 3 credits each and courses applied here may also be used towards satisfying the Distribution requirement.

Code	Title	Credits
EN.661.110	Professional Writing and Communication	3
One additional Writing Intensive (W) course		3
<i>Total Credits</i>		6

¹ EN.661.110 Professional Writing and Communication will satisfy both Writing Intensive and Distribution requirements.

Distribution for BS in Civil Engineering

A maximum of 3 credits of a Satisfactory/Unsatisfactory (S/U) grade will be accepted. Courses must be at least 3 credits each and may overlap with the Writing Intensive requirement. Elementary language courses, which do not carry an area designator, can be used to satisfy the Distribution requirement for engineering students.

Code	Title	Credits
EN.661.110	Professional Writing and Communication ¹	3
Five Humanities (H) or Social Sciences (S) courses at any level		15
<i>Total Credits</i>		18

¹ EN.661.110 Professional Writing and Communication will satisfy both Writing Intensive and Distribution requirements.

MAJOR REQUIREMENTS

MATHEMATICS

A grade of D or higher is required. No Satisfactory/Unsatisfactory (S/U) grade will be accepted.

Code	Title	Credits
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
EN.553.291	Linear Algebra and Differential Equations	4
Total Credits		16

BASIC SCIENCES

A grade of D or higher is required. No Satisfactory/Unsatisfactory (S/U) grade will be accepted.

Code	Title	Credits
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.173.111	General Physics Laboratory I ¹	1
EN.560.312	Electromagnetism & Sensors Lab	1
Basic Science Elective ²		3
Total Credits		13

¹ If a student earns exam credit for Physics I, they MUST still take either AS.173.111 General Physics Laboratory I or another 1 credit N laboratory course.

² Recommended courses: AS.171.102 General Physics: Physical Science Major II, AS.171.108 General Physics for Physical Science Majors (AL), AS.270.305 Energy Resources in the Modern World, AS.270.356 A Modern History of Climate Science, or with permission from the Director of Undergraduate Studies, a 300-level or higher course with area N designation.

The Civil Engineering-specific requirements are comprised of Civil Engineering Fundamentals, CaSE Experience, CaSE Professional Practice, and CaSE Technical Electives. A grade of C- or higher is required, but a maximum of two D grades may be counted in the following categories: Civil Engineering Fundamentals, CaSE Professional Practice, CaSE Experiences, and CaSE Technical Electives. No Satisfactory/Unsatisfactory (S/U) grade will be accepted.

CIVIL ENGINEERING FUNDAMENTALS

Code	Title	Credits
EN.500.113	Gateway Computing: Python	3
EN.560.100	Civilization Engineered	3
EN.560.101	Civilization Engineered: Data-driven Solutions for Communities	3
EN.560.192	Civilization Engineered: Cornerstone Design Project	1
EN.560.201	Statics & Mechanics of Materials	3
EN.560.211	Statics and Mechanics of Materials Laboratory	1

EN.560.240	Uncertainty, Reliability and Decision-making	3
EN.560.250	Intro to Mathematical Decision Making	3
EN.560.301	Structural Systems I	3
EN.560.302	Structural Systems II	3
EN.560.305	Soil Mechanics	4
EN.560.330	Foundation Design	3
EN.560.342	(Smart and Resilient Cities)	3
EN.560.355	Dynamical Systems	3
EN.560.362	Engineering Mechanics and Materials	3
EN.560.449	Energy Systems	3
or EN.520.370	Introduction to Renewable Energy Engineering	
EN.560.458	Natural Disaster Risk Modeling	3

Total Credits 48

CaSE PROFESSIONAL PRACTICE

In preparation for CaSE Professional Practice, students must also take the Fundamentals of Engineering (FE) exam in the spring of their graduating year.

Code	Title	Credits
EN.560.391	CaSE Careers I	0.5
EN.560.392	CaSE Careers II	0.5
EN.560.401	Design Theory and Practice	3
EN.560.402	Integrated Design Project	3
EN.660.463	Engineering Management & Leadership	3
EN.661.110	Professional Writing and Communication	3
Total Credits		13

CaSE TECHNICAL ELECTIVES

Courses may be taken as Satisfactory/Unsatisfactory (S/U) only with approval from the Director of Undergraduate Studies.

Code	Title	Credits
Two Technical Elective Courses ¹		6
Total Credits		6

¹ Technical electives are designed to provide students with opportunities to explore the field of civil engineering in greater depth. These courses must have E distribution and be 300-level or higher. 300-level courses with N or Q distribution may be allowed with approval from the Director of Undergraduate Studies.

FREE ELECTIVES

Courses may be taken as Satisfactory / Unsatisfactory (S/U).

Code	Title	Credits
Elective courses to reach 125 credits		

Sample Program of Study

This sample illustrates the general sequence of courses; individual programs may vary as a result of exam credits, study abroad, or pursuit of a minor in another department. For more information, visit the Civil and Systems Engineering website (<https://engineering.jhu.edu/case/>).

First Year

Fall	Credits	Spring	Credits
AS.030.101	3	AS.110.109	4
AS.030.105	1	AS.171.101	4
AS.110.108	4	AS.173.111	1
EN.500.113	3	EN.560.101	3
EN.501.124	2	EN.560.192	1
EN.560.100	3	EN.661.110 (counts as Writing Intensive and a Humanities / Social Sciences Elective)	3
Optional HEART course	0-1		
		16-17	16

Second Year

Fall	Credits	Spring	Credits
EN.553.291	4	AS.110.202	4
EN.560.201	3	EN.560.250	3
EN.560.211	1	EN.560.301	3
EN.560.240	3	EN.560.305	4
Humanities / Social Sciences Elective (Writing-Intensive)	3	Humanities / Social Sciences Elective	3
		14	17

Third Year

Fall	Credits	Spring	Credits
EN.560.302	3	EN.560.312	1
EN.560.330	3	EN.560.342 (Smart and Resilient Cities)	3
EN.560.355	3	EN.560.362	3
EN.560.391	0.5	EN.560.392	0.5
Humanities / Social Sciences Elective	3	Humanities / Social Sciences Elective	3
Free Elective	3	Basic Science Elective	3-4
		Free Elective	3
		15.5	16.5-17.5

Fourth Year

Fall	Credits	Spring	Credits
EN.560.401	3	EN.560.402	3
EN.560.449	3	EN.560.458	3
EN.660.463	3	CaSE Technical Elective	3
CaSE Technical Elective	3	Humanities / Social Sciences Elective	3
Free Elective	3	Free Elective	3
		15	15

Total Credits 125-127**Accreditation Statement**

The B.S. in Civil Engineering program is accredited by the Engineering Accreditation Commission of ABET, under the General Criteria and the Program Criteria for Civil and Similarly Named Engineering Program Criteria.

Program Educational Objectives

Consistent with our Educational Mission and the Mission of the Whiting School of Engineering, the Program Educational Objectives (PEOs) for the Civil Engineering program at Johns Hopkins University are to produce graduates who:

- Rise to positions of leadership in their chosen fields, within organizations that require innovative, adaptable, and systems thinkers, and that consider the engineering, societal, and environmental impacts of their decisions.
- Dedicate themselves to lifelong learning, service, and teaching to foster excellence and disseminate knowledge in their chosen fields.
- Innovate and implement resilient, sustainable, and equitable solutions to meet evolving societal challenges.

Student Outcomes

Students graduating with a B.S. in Civil Engineering will have demonstrated:

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.

Enrollments and Graduates**Enrollment***

Term	Total	First-Year	Sophomore	Junior	Senior
Fall 2016	43	6	6	17	14
Fall 2017	42	9	6	11	16
Fall 2018	27	-	11	4	12
Fall 2019	19	1	3	10	6
Fall 2020	24	7	2	5	10
Fall 2021	18	4	6	2	6
Fall 2022					
Fall 2023					

B.S. Degrees Awarded**

Academic Year	Total
2016-2017	13
2017-2018	16
2018-2019	10
2019-2020	6

2020-2021	10
2021-2022	
2022-2023	

* Based on Fall census each year

** Includes August, December, and May conferrals each academic year

Continuous Improvement

The Department of Civil and Systems Engineering strives to continuously improve its curriculum by using performance criteria to regularly assess its program educational objectives (what it expects its students to attain post-graduation) and its student outcomes (what skills it expects its students to demonstrate). The civil engineering program uses the results of each assessment to continuously improve upon its curriculum and thus ensure that it is meeting the needs of its students.