

CIVIL ENGINEERING, BACHELOR OF SCIENCE

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://mse.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 2025. Students who entered JHU as degree-seeking students prior to Fall 2025 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 CaSE department recognizes students with exemplary academic records by awarding Departmental Honors to students with a Grade Point Average of 3.75 GPA or higher in Core requirements. Students with either a primary major or an additional major in civil engineering are evaluated for departmental honors.

UNIVERSITY 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/>).

WSE SCHOOL REQUIREMENTS

FIRST-YEAR SEMINAR OR DESIGN CORNERSTONE REQUIREMENT

All WSE primary majors are required to complete a First-Year Seminar (FYS) or a Design Cornerstone class with a grade of Satisfactory (S).

The first-year seminar requirement is waived for students who transfer into the university after the first year. These students must still complete the minimum number of required credits to graduate.

Code	Title	Credits
	One FYS or Design Cornerstone course	2-3
Total Credits		2-3

FOUNDATIONAL ABILITIES REQUIREMENTS

All students with a primary major within the Whiting School of Engineering must complete the Foundational Abilities (<https://e-catalogue.jhu.edu/ksas-wse/undergraduate-policies/academic-policies/requirements-bachelors-degree/#writingtext>) (FA) in six designated areas. Grades of C- or higher are required. No Satisfactory/Unsatisfactory (S/U) grades will be accepted, except in cases where a course is offered on an S/U basis only, such as the Bootcamp Computing courses. For Foundational Abilities that require the submission of ePortfolio assignments in an engineering discipline, students must achieve a minimum assessment of "Proficient".

FA1 WRITING AND COMMUNICATION

This Foundational Abilities requirement has four parts:

1. Foundational Course in Writing: All WSE students are required to successfully complete one foundational course in writing. Courses that will satisfy the writing course requirement are listed below:

Code	Title	Credits
Choose one from the following:		
AS.004.101	Reintroduction to Writing	3
EN.661.110	Professional Writing and Ethics ¹	3

¹ EN.661.110 Professional Writing and Ethics applies to both the FA1 Foundational Course requirement and the civil engineering core requirements.

2. Writing ePortfolio Assignment: All WSE students must be assessed as at least proficient in one or more writing ePortfolio assignments. Courses that include at least one assignment eligible for the writing ePortfolio assignment requirement can be identified in SIS (<https://sis.jhu.edu/sswf/>) by searching for the specific tag listed below:

Code	Title	Credits
EN	Foundational Ability tag FA1.1eP	

3. Foundational Course in Oral Communication: All WSE students are required to successfully complete one foundational course in oral communication. The course that will satisfy the oral communication course requirement is listed below:

Code	Title	Credits
EN.661.250	Oral Presentations	3

4. Oral Communication ePortfolio Assignment: All WSE students must be assessed as at least proficient in one or more oral communication ePortfolio assignments. Courses that include at least one assignment applicable to the oral communication ePortfolio assignment requirement can be identified in SIS (<https://sis.jhu.edu/sswf/>) by searching for the specific tag listed below:

Code	Title	Credits
EN	Foundational Ability tag FA1.2eP	

FA2 SCIENTIFIC AND QUANTITATIVE REASONING

This Foundational Abilities requirement has five parts. The CaSE department has specified the courses below that will satisfy the requirements.

1. Calculus I: Calculus I applies to both the FA2 requirement and the Civil Engineering Mathematics requirements.

Code	Title	Credits
AS.110.108	Calculus I (Physical Sciences & Engineering)	4

2. Calculus II: Calculus II applies to both the FA2 requirement and the Civil Engineering Mathematics requirements.

Code	Title	Credits
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4

3. Probability and Statistics: The Probability and Statistics course applies to both the FA2 requirement and the Civil Engineering Core requirement.

Code	Title	Credits
EN.560.240	Uncertainty, Reliability and Decision-making	3

4. Computing and Data Science: The computing course applies to both the FA2 requirement and the Civil Engineering computing requirement.

Code	Title	Credits
Choose one from the following:		
EN.500.113	Gateway Computing: Python	3
EN.500.112 & EN.500.133	Gateway Computing: JAVA and Bootcamp: Python ¹	4

¹ If EN.500.112 Gateway Computing: JAVA is taken, then EN.500.133 Bootcamp: Python is required.

5. Natural Science and Laboratory: One natural science lecture and its associated laboratory will apply to both the FA2 requirement and the Civil Engineering Basic Sciences requirement. Additional natural science lectures and labs are required for the major; see the Major Requirements section for details.

Code	Title	Credits
Choose one from the following:		
AS.030.101 & AS.030.105	Introductory Chemistry I and Introductory Chemistry Laboratory I	4
AS.171.101 & AS.173.111	General Physics: Physical Science Major I and General Physics Laboratory I	5
AS.171.107 & AS.173.111	General Physics for Physical Sciences Majors (AL) and General Physics Laboratory I	5

FA3 CREATIVE EXPRESSION

A minimum of 12 credits of coursework in creative expression (FA3) and engagement with society (FA4) is required. At least three of these credits must be earned through a course tagged FA3. Courses with the FA3 tag can be identified in SIS (<https://sis.jhu.edu/sswf/>) by searching for the specific tag listed below:

Code	Title	Credits
EN	Foundational Ability tag FA3	3

In addition to the required FA3 and FA4 courses, students must complete six additional credits from any combination of FA3 or FA4 courses, for a total of 12 credits in FA3 and FA4.

FA4 ENGAGEMENT WITH SOCIETY

A minimum of 12 credits of coursework in creative expression (FA3) and engagement with society (FA4) is required. At least three of these credits must be earned through a course tagged FA4. Courses with the FA4 tag can be identified in SIS (<https://sis.jhu.edu/sswf/>) by searching for the specific tag listed below:

Code	Title	Credits
EN	Foundational Ability tag FA4	3

In addition to the required FA3 and FA4 courses, students must complete six additional credits from any combination of FA3 or FA4 courses, for a total of 12 credits in FA3 and FA4.

FA5 ETHICAL REFLECTION

This Foundational Abilities requirement has two parts:

1. Foundational Course in Ethical Reflection: All WSE students are required to successfully complete one foundational course in ethical reflection. The CaSE department has specified the courses below that will satisfy the FA5 Foundational Course in Ethical Reflection requirement and the Core requirement.

Code	Title	Credits
EN.660.463	Engineering Management & Leadership	3

2. Ethical Reflection ePortfolio Assignment: All WSE students must be assessed as at least proficient in one or more ethical reflection ePortfolio assignments. Courses that include at least one assignment eligible for

the ethical reflection ePortfolio assignment requirement can be identified in SIS (<https://sis.jhu.edu/sswf/>) by searching for the specific tag listed below:

Code	Title	Credits
EN Foundational Ability tag FA5eP		

FA6 CONCEIVING OF AND REALIZING PROJECTS

All WSE students must be assessed as at least proficient in two or more conceiving of and realizing projects ePortfolio assignments. Courses that include at least one assignment eligible for the conceiving of and realizing projects ePortfolio assignment requirement can be identified in SIS (<https://sis.jhu.edu/sswf/>) by searching for the specific tag listed below:

Code	Title	Credits
EN Foundational Ability tag FA6eP		

MAJOR REQUIREMENTS

MATHEMATICS

A total of 16 credits in mathematics is required. If a student receives a waiver for Calculus I and/or II or transfers in courses with fewer credits than the corresponding JHU course credits, they must make up the difference by completing additional mathematics coursework.

Grades of C- or higher are required for courses fulfilling FA2 requirements; otherwise, grades of D or higher are required. No Satisfactory/Unsatisfactory (S/U) grades will be accepted.

Code	Title	Credits
AS.110.108	Calculus I (Physical Sciences & Engineering) (FA2 Requirement)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering) (FA2 Requirement)	4
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
EN.553.291	Linear Algebra and Differential Equations ¹	4-8
or AS.110.201	Linear Algebra	
& AS.110.302	and Differential Equations and Applications	
or AS.110.212	Honors Linear Algebra	
& AS.110.302	and Differential Equations and Applications	
or EN.553.295	Linear Algebra for Data Science	
& AS.110.302	and Differential Equations and Applications	
Total Credits		16-20

¹ Students may fulfill the requirement by taking either a combined course or two separate courses in Linear Algebra and Differential Equations.

BASIC SCIENCE

A total of 13 credits in basic science courses is required. One natural science lecture and its associated laboratory will apply to both the FA2 requirement and the Civil Engineering Basic Sciences requirement. Students who receive exam credit for Physics I are waived from the corresponding lab courses, but will not receive credit for the lab. This reduces the total basic science credit requirement by 1 credit. To fulfill the 13-credit requirement, students MUST still take either AS.173.111 General Physics Laboratory I or another 1-credit laboratory course designated as Natural Science (N).

Grades of C- or higher are required for courses fulfilling FA2 requirements; otherwise, grades of D or higher are required. No Satisfactory/Unsatisfactory (S/U) grades 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
EN.560.312	Electromagnetism & Sensors Lab	1
Basic Science Elective. Select one of the following:		3-4
AS.171.102	General Physics: Physical Science Major II	
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.270.205	Introduction to Geographic Information Systems and Geospatial Analysis	
AS.270.220	The Dynamic Earth: An Introduction to Geology	
AS.171.312	Statistical Physics/Thermodynamics ¹	
Total Credits		13-14

¹ Alternative versions of Thermodynamics exist across KSAS and WSE. A comprehensive list of courses that can be used to fulfill this requirement may be found here: <https://e-catalogue.jhu.edu/arts-sciences/full-time-residential-programs/degree-programs/earth-planetary-science/energy-minor/>

COMPUTING REQUIREMENT

A grade of C- or higher in the Gateway Computing course and a grade of S in the Bootcamp course are required to apply toward the FA2 requirement and to the computing requirement in the major.

Code	Title	Credits
EN.500.113	Gateway Computing: Python (FA2 Requirement)	3
or EN.500.112	Gateway Computing: JAVA	
& EN.500.133	and Bootcamp: Python	
Total Credits		3-4

CORE REQUIREMENTS

Grades of C- or higher are required. Excluding courses that fulfill the FA course requirements, a maximum of two D grades may be applied toward the Core Requirements, which include CaSE Fundamentals, Civil Engineering Fundamentals, CaSE Professional Practice, and CaSE Technical Electives. Satisfactory/Unsatisfactory (S/U) grades will not be accepted.

CaSE FUNDAMENTALS

Code	Title	Credits
EN.560.100	Civilization Engineered: Structures and Systems	3
EN.560.101	Civilization Engineered: Data-driven Solutions for Communities (FA1.2eP)	3
EN.560.192	CaSE Cornerstone Design Project (FA6eP - Project 1)	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.560.355	Dynamical Systems	3
EN.560.458	Natural Disaster Risk Modeling	3
Total Credits		23

CIVIL ENGINEERING FUNDAMENTALS

Code	Title	Credits
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 Cities)	3
EN.560.362	Engineering Mechanics and Materials	3
EN.560.449	Energy Systems	3
or EN.520.370	Introduction to Renewable Energy Engineering	
Total Credits		22

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 (FA1.1eP, FA5eP)	0.5
EN.560.392	CaSE Careers II	0.5
EN.560.401	Design Theory and Practice (Must take both EN.560.401 and EN.560.402 to satisfy FA6eP - Project 2)	3
EN.560.402	CaSE Capstone Design Project (Must take both EN.560.401 and EN.560.402 to satisfy FA6eP - Project 2)	3
EN.660.463	Engineering Management & Leadership (FA5 Foundational Course in Ethical Reflection)	3
EN.661.110	Professional Writing and Ethics (FA1 Foundational Course in Writing)	3
Total Credits		13

CaSE TECHNICAL ELECTIVES

Technical electives are designed to provide students with opportunities to explore the field of civil engineering in greater depth. These courses must come from within the Civil and Systems Engineering department (EN.560) and be 300-level or higher.

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		6
Total Credits		6

FREE ELECTIVES

Grades of D or higher are required. Satisfactory (S) grades will be accepted.

Code	Title	Credits
Elective courses to reach 125 credits		

Sample Program

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

First Year		
Fall	Credits Spring	Credits
AS.030.101 ¹	3 AS.110.109 (FA2 Calculus II Requirement)	4
AS.030.105 ¹	1 AS.171.101 ¹	4
AS.110.108 (FA2 Calculus I Requirement)	4 AS.173.111 ¹	1
EN.500.113 (FA2 Computing and Data Science Requirement)	3 EN.560.101 (FA1.2eP)	3
EN.560.100	3 EN.560.192 (FA6eP - Project 1)	1
FYS or Design Cornerstone	2-3 EN.661.110 or AS.004.101 (FA1 Foundational Course in Writing)	3
Optional HEART course	0-1	

16-18 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 (FA2 Probability and Statistics Requirement)	3 EN.560.305	4
Basic Science Elective	3 EN.661.250 (FA1 Foundational Course in Oral Communication)	3

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Third Year		
Fall	Credits Spring	Credits
EN.560.302	3 EN.560.312	1
EN.560.330	3 EN.560.342 (Smart Cities)	3
EN.560.355	3 EN.560.362	3
EN.560.391 (FA1.1eP, FA5eP)	0.5 EN.560.392	0.5
Course with EN Foundational Ability tag FA4 (Engagement with Society)	3 Course with EN Foundational Ability tag FA3 (Creative Expression)	3
Free Elective	3 Course with EN Foundational Ability tag FA3 or FA4	3
	Free Elective	3

15.5 16.5

Fourth Year		
Fall	Credits Spring	Credits
EN.560.401 (Must take both EN.560.401 and EN.560.402 to satisfy FA6eP - Project 2)	3 EN.560.402 (Must take both EN.560.401 and EN.560.402 to satisfy FA6eP - Project 2)	3
EN.560.449	3 EN.560.458	3

CaSE Technical Elective	3 CaSE Technical Elective	3
EN.660.463 (FA5 Foundational Course in Ethical Reflection)	3 Course with EN Foundational Ability tag FA3 or FA4	3
Free Elective	3 Free Elective	3
	15	15

Total Credits 125-127

¹ One of the natural science courses with its associated laboratory will satisfy the FA2 requirement. The other natural science courses with their associated laboratories will satisfy the Basic Sciences requirement for the major.

Sample Program with Hopkins Semester

This sample illustrates a possible sequence of courses for students wishing to pursue a Hopkins Semester in the spring of their junior year; the sequence may vary as a result of exam credits or pursuit of a minor in another department. Students may explore additional options with their professional academic advisor if their desired Hopkins Semester experience varies from what is presented here.

First Year

Fall	Credits Spring	Credits
AS.030.101 ¹	3 AS.110.109 (FA2 Calculus II Requirement)	4
AS.030.105 ¹	1 AS.171.101 ¹	4
AS.110.108 (FA2 Calculus I Requirement)	4 AS.173.111 ¹	1
EN.500.113 (FA2 Computing and Data Science Requirement)	3 EN.560.192 (FA6eP - Project 1)	1
EN.560.100	3 EN.560.101 (FA1.2eP)	3
FYS or Design Cornerstone	2-3 EN.661.110 or AS.004 101 (FA1 Foundational Course in Writing)	3
Optional HEART course	0-1	
	16-18	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 (FA2 Probability and Statistics Requirement)	3 EN.560.305	4
Basic Science Elective	3 EN.560.392	0.5
Course with EN Foundational Ability tag FA3 (Creative Expression)	3 EN.661.250 (FA1 Foundational Course in Oral Communication)	3
	17	17.5

Third Year

Fall	Credits Spring	Credits
EN.560.302	3 Hopkins Semester	
EN.560.355	3 Free Elective	3
EN.560.391 (FA1.1eP, FA5eP)	0.5 Free Elective	3

EN.560.330	3 Free Elective	3
Course with EN Foundational Ability tag FA4 (Engagement with Society)	3 Free Elective	3
Course with EN Foundational Ability tag FA3 or FA4	3	
	15.5	12

Fourth Year

Fall	Credits Spring	Credits
EN.560.401 (Must take both EN.560.401 and EN.560.402 to satisfy FA6eP - Project 2) ²	3 EN.560.312	1
EN.560.449	3 EN.560.342 (Smart Cities)	3
CaSE Technical Elective	3 EN.560.362	3
CaSE Technical Elective	3 EN.560.402 (Must take both EN.560.401 and EN.560.402 to satisfy FA6eP - Project 2)	3
EN.660.463 (FA5 Foundational Course in Ethical Reflection)	3 EN.560.458	3
	Course with EN Foundational Ability tag FA3 or FA4	3
	15	16

Total Credits 125-127

¹ One of the natural science courses with its associated laboratory will satisfy the FA2 requirement. The other natural science courses with their associated laboratories will satisfy the Basic Sciences requirement for the major.

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	16	1	5	8	2
Fall 2023	19	7	2	5	5
Fall 2024	28	12	7	3	6

B.S. Degrees Awarded**

Academic Year	Total
2016-2017	13
2017-2018	16
2018-2019	10
2019-2020	6
2020-2021	10
2021-2022	7
2022-2023	2
2023-2024	4

* 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.