CIVIL ENGINEERING, BACHELOR OF SCIENCE

The Department of Civil and Systems Engineering offers an undergraduate program that strives to educate intellectual leaders of the profession by instilling in them a fundamental understanding of the mathematical and physical principles that underlie civil engineering science, an appreciation for the challenges of creative engineering design, and a sense of responsibility for professional service. Civil Engineering is a broad field with many subdisciplines. The Civil Engineering curriculum exposes students to the fields of structural engineering, engineering mechanics, systems engineering, environmental engineering, water resources, and geotechnical engineering.

The program has the following as its objectives:

1. That within a few years of graduation, our graduates will attain:
   a. an advanced degree in engineering, or
   b. required experience toward professional licensure as an engineer, or
   c. an advanced degree in a field other than engineering, or
   d. a position within an organization that broadly supports the goals of civil engineering; and
2. a position or degree that values adaptability and innovation in their work.

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.

The program has been accredited by the Engineering Accreditation Commission of ABET since 1936.

Financial Aid

Scholarships and other forms of financial assistance for undergraduates are described under Admissions and Finances (http://e-catalog.jhu.edu/university-wide-policies-information/admission-aid/). In addition, some undergraduate students are employed by departmental faculty to provide assistance on research projects.

Combined Bachelor’s/Master’s Programs

The Department of Civil and Systems Engineering offers combined bachelor’s/master’s degrees. One program combines a B.S. in Civil Engineering with a Master of Science in Engineering (M.S.E.) in Civil Engineering. For students who are admitted to this program, the two degrees typically require five years total to complete. The other option combines a B.S. in Civil Engineering with a Master of Science in Engineering Management (M.S.E.M.) (http://msem.engineering.jhu.edu/). Formal application through the M.S.E.M. Department (http://msem.engineering.jhu.edu/) is required. Students enrolled in a Combined B.S./M.S.E. 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 http://engineering.jhu.edu/academics/combined-bachelors-masters/ (http://engineering.jhu.edu/academics/combined-bachelors-masters/html)

Program Requirements

The B.S. degree in civil engineering requires 127 credits. A brief summary of the requirements is listed below. For more detailed information students should look at the Department of Civil and Systems Engineering website (http://engineering.jhu.edu/civil/undergraduate-studies/). (http://engineering.jhu.edu/civil/undergraduate-studies/) Each student is assigned a faculty advisor who provides the guidance needed to meet these requirements.

Note that no course listed as a requirement may be taken as Satisfactory/Unsatisfactory (S/U).

A maximum of 3 credits from the Humanities and Social Science (H/S) requirements may be taken S/U.

Technical electives may be taken S/U only with the approval of the advisor. No more than two grades of D in the required engineering and technical electives may be counted.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS.171.101</td>
<td>General Physics: Physical Science Major I</td>
<td>4</td>
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<tr>
<td>or AS.171.107</td>
<td>General Physics for Physical Sciences Majors (AL)</td>
<td></td>
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<tr>
<td>AS.173.111</td>
<td>General Physics Laboratory I</td>
<td>1</td>
</tr>
<tr>
<td>EN.560.112</td>
<td>(Electromagnetism &amp; Sensors Lab)</td>
<td>1</td>
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<tr>
<td>AS.030.101</td>
<td>Introductory Chemistry I</td>
<td>3</td>
</tr>
<tr>
<td>AS.030.105</td>
<td>Introductory Chemistry Laboratory I</td>
<td>1</td>
</tr>
<tr>
<td>AS.270.103</td>
<td>Introduction to Global Environmental Change</td>
<td>3</td>
</tr>
<tr>
<td>1 additional Basic Science elective</td>
<td>3</td>
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Mathematics

<table>
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<tr>
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<th>Credits</th>
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<tbody>
<tr>
<td>AS.110.108</td>
<td>Calculus I (Physical Sciences &amp; Engineering)</td>
<td>4</td>
</tr>
<tr>
<td>AS.110.109</td>
<td>Calculus II (For Physical Sciences and Engineering)</td>
<td>4</td>
</tr>
<tr>
<td>AS.110.202</td>
<td>Calculus III</td>
<td>4</td>
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<tr>
<td>or AS.110.211</td>
<td>Honors Multivariable Calculus</td>
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<tr>
<td>EN.553.291</td>
<td>Linear Algebra and Differential Equations</td>
<td>4</td>
</tr>
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Humanities and Social Sciences

Students are encouraged to create a program of study that is supplemented by meaningful classes outside of engineering.
FREE ELECTIVES
Select 12 credits of free electives 12

Case Fundamentals
EN.560.100 Civilization Engineered 3
EN.560.113 Gateway Computing: Python 3
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) 5 3
EN.560.255 (Dynamical Systems) 5 3
EN.560.301 (Structural Systems I) 5 3
EN.560.302 Structural Systems II 3
EN.560.305 Soil Mechanics 4
EN.560.330 Foundation Design 3
EN.560.362 (Engg Mech & Matls) 5 3
EN.560.462 Failure Mechanisms in Str Matls 3
EN.560.458 Natural Disaster Risk Modeling 3

Case Professional Practice 3
EN.661.110 Professional Writing and Communication 3
EN.660.361 Engineering Business and Management 3
EN.560.401 Design Theory & Pract. 3
EN.560.402 (Integrated Design Project) 5 3

Case Experiences
EN.560.191 CaSE Collaborative .5
EN.560.192 (CaSE Design) 5 .5
EN.560.291 CaSE Coding .5
EN.560.292 (CaSE Research) 5 .5
EN.560.391 Seminar/Prof Dev .5
EN.560.392 (Seminar/Prof Dev) 5 .5

Technical Electives
Students have the opportunity to explore one or more of the civil engineering technical areas (engineering mechanics, environmental engineering, geotechnical engineering, structural engineering, systems engineering and water resources) in greater depth through technical electives. 4

Total Credits 127

1 ABET defines a basic science as consisting of "chemistry and physics, and other biological, chemical and physical sciences, including astronomy, biology, climatology, ecology, geology, meteorology, or oceanography"; there are several courses offered by the Department of Earth and Planetary Sciences that may be used here, including AS.270.220 The Dynamic Earth: An Introduction to Geology. Faculty advisors can provide more guidance when needed.

2 Classes in the Humanities and Social and Behavioral Sciences provide students with an appreciation for societal concerns and humanistic issues, tools that are essential for a professional who serves the public good. A minimum of 18 credits from six 3-credit H or S courses is required. One of the H/S electives must be used to fulfill a writing intensive requirement. This can either be done through AS.060.113 Expository Writing/AS.060.114 Expository Writing or a 300-level, Writing-Intensive, H or S elective course. See the Distribution tab in the Requirements for a Bachelor's Degree (http://e-catalog.jhu.edu/undergrad-students/academic-policies/requirements-for-a-bachelors-degree/) section for two exceptions to the rule that each H/S distribution course be at least 3 credits.

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

4 Technical electives (all required to be at or above the 300-level) are designed to provide students with greater depth in one or more of the civil engineering technical areas above. To that end, a minimum of one 3-credit technical elective must be in a civil engineering technical area. One 3-credit technical elective must have an E distribution credit, but may be a course offered outside of the traditional civil engineering areas, and one 3-credit technical elective may come from any (Q), (N), or (E) course.

5 This course will be offered starting in the 2021-2022 Academic Year.

Sample Program of Study
To view a sample civil engineering program, visit the Civil and Systems Engineering website and click on Undergraduate Studies, Academic Advising or click here. (https://engineering.jhu.edu/civil/undergraduate-studies/sample-curriculum/) This sample illustrates the general sequence of courses; individual programs may vary as a result of AP credits, study abroad, or pursuit of a minor in another department.