

Civil Engineering, B.S.C.E.

Degree Offered

- Bachelor of Science in Civil Engineering (B.S.C.E.)

Nature of the Program

Civil engineers work with problems that directly impact the health and economic vitality of people and communities. These problems include waste disposal, environmental pollution, transportation systems analysis and design, water resource development, and the design, construction, and rehabilitation of constructed facilities such as dams, bridges, buildings, and highways.

Thus, the challenges and opportunities for a civil engineer lie in combining technical competence with a human concern for the applications of technology. To help students to understand their role in the community, to be effective in working with design teams involving other engineers and other professionals, and to be effective in written and spoken communications, the curriculum attempts to give a meaningful educational experience in the humanities, social studies, English, and economics.

The goal of the undergraduate curriculum in civil engineering is to prepare graduate civil engineers to meet the present and the future infrastructural and environmental needs of society. This requires an education based on scientific and engineering fundamentals as well as one that incorporates experience in engineering design using modern technology. Because the systems they design impact the public directly, civil engineers must be aware of the social and environmental consequences of their designs. Graduates must be prepared to work and communicate with other professionals in a variety of associations and organizations. Ethics and life-long learning are essential components in the education of civil engineers.

During the course of study, civil engineering students are given a solid grounding in mathematics, physics, and chemistry. Added to this is extensive development of the fundamentals of materials science, construction, water and environmental, soils, structural, and transportation systems engineering. This broad base of knowledge is provided to assure that civil engineers are educated in all branches of the profession and to permit continuous learning throughout a professional lifetime. Throughout the program, each student works with an academic advisor in the selection of electives. Specialization in one or more of the branches of civil engineering is possible by selection of a sequence of technical electives during the junior and senior years.

The Bachelor of Science in Civil Engineering program is accredited by the Engineering Accreditation Commission of ABET, <https://www.abet.org>.

Program Educational Objectives

- The graduates will be successful in their professional careers as civil engineers in industry, public agencies, and/or post-graduate education.
- The graduates will continue to develop professionally and serve in leadership roles.
- The graduates will be successful in demonstrating their obligations to the profession, to their employer, and to society.

General Education Foundations

Please use this link to view a list of courses that meet each GEF requirement. (<http://registrar.wvu.edu/gef/>)

NOTE: Some major requirements will fulfill specific GEF requirements. Please see the curriculum requirements listed below for details on which GEFs you will need to select.

Code	Title	Hours
General Education Foundations		
F1 - Composition & Rhetoric		3-6
ENGL 101 & ENGL 102 or ENGL 103	Introduction to Composition and Rhetoric and Composition, Rhetoric, and Research Accelerated Academic Writing	
F2A/F2B - Science & Technology		4-6
F3 - Math & Quantitative Reasoning		3-4
F4 - Society & Connections		3
F5 - Human Inquiry & the Past		3
F6 - The Arts & Creativity		3
F7 - Global Studies & Diversity		3
F8 - Focus (may be satisfied by completion of a minor, double major, or dual degree)		9
Total Hours		31-37

Please note that not all of the GEF courses are offered at all campuses. Students should consult with their advisor or academic department regarding the GEF course offerings available at their campus.

Degree Requirements

Students must meet the following criteria to qualify for a Bachelor of Science in Civil Engineering:

- Complete a minimum of 132 credit hours
- Satisfy WVU's undergraduate degree requirements
- Satisfy Statler College's undergraduate degree requirements (<http://catalog.wvu.edu/undergraduate/collegeofengineeringandmineralresources/#policies>)
- Complete all courses listed in the curriculum requirements with the required minimum grades
- Attain an overall grade point average of 2.00 or better
- Attain a WVU grade point average of 2.00 or better
- Attain a Statler grade point average of 2.00 or better
- A maximum of one math or science course with a grade of D+, D, or D- may apply toward a Statler College degree
- Complete a survey regarding their academic and professional experiences at WVU, as well as post-graduation job placement or continuing education plans

The Statler GPA is computed based on all work taken at WVU with a subject code within Statler College (BIOM, BMEG, CE, CHE, CPE, CS, CSEE, CYBE, EE, ENGR, ENVE, ETEC, IENG, IH&S, MAE, MINE, PDA, PNGE, SAFM, SENG) excluding ENGR 140, ENGR 150, and CS 101. The WVU GPA is computed based on all work taken at West Virginia University. The Overall GPA is computed based on all work taken at West Virginia University and transfer work.

Curriculum Requirements

Code	Title	Hours
	University Requirements	16
	Fundamentals of Engineering Requirements	5
	Math and Science Requirements	31
	Civil Engineering Program Requirements	80
Total Hours		132

University Requirements

Code	Title	Hours
	General Education Foundations (GEF) 1, 2, 3, 4, 5, 6, 7, and 8 (31-37 Credits)	
	Outstanding GEF Requirements 1, 5, 6, 7	15
ENGR 191	First-Year Seminar	1
Total Hours		16

Fundamentals of Engineering Requirements

Code	Title	Hours
A minimum grade of C- is required in all Fundamentals of Engineering courses.		
ENGR 101	Engineering Problem Solving 1	2
Engineering Problem Solving (Select one of the following):		3
CHE 102	Introduction to Chemical Engineering	
ENGR 102	Engineering Problem-Solving 2	
ENGR 103	Introduction to Nanotechnology Design	
MAE 102	Introduction to Mechanical and Aerospace Engineering Design	
Total Hours		5

Math and Science Requirements

Code	Title	Hours
A minimum grade of C- is required in all Math and Science courses. *		
Calculus I (GEF 3):		4

MATH 155	Calculus 1	
MATH 153 & MATH 154	Calculus 1a with Precalculus and Calculus 1b with Precalculus	
MATH 156	Calculus 2 (GEF 8)	4
MATH 251	Multivariable Calculus	4
MATH 261	Elementary Differential Equations	4
CHEM 115 & 115L	Fundamentals of Chemistry 1 and Fundamentals of Chemistry 1 Laboratory (GEF 2B)	4
PHYS 111 & 111L	General Physics 1 and General Physics 1 Laboratory (GEF 8)	4
STAT 215	Introduction to Probability and Statistics	3
Choose one of the following:		4
BIOL 115 & 115L	Principles of Biology and Principles of Biology Laboratory	
GEOL 101 & 101L	Planet Earth and Planet Earth Laboratory	
Total Hours		31

Civil Engineering Program Requirements

Code	Title	Hours
CE 201	Introduction to Civil Engineering	1
CE 210 & 210L	Introduction to Computer Aided Design and Drafting for Civil Engineers and Introduction to Computer Aided Design and Drafting for Civil Engineers Laboratory	3
CE 301	Engineering Professional Development	1
CE 321	Fluid Mechanics for Civil Engineers	3
CE 479	Integrated Civil Engineering Design-Capstone	3
CE 332	Introduction to Transportation Engineering	3
CE 347 & 347L	Introduction to Environmental Engineering and Introduction to Environmental Engineering Laboratory	4
CE 351 & 351L	Introductory Soil Mechanics and Introductory Soil Mechanics Laboratory	4
CE 361 & 361L	Structural Analysis 1 and Structural Analysis 1 Laboratory	4
ECON 201	Principles of Microeconomics (GEF 4)	3
WRIT 305	Technical Writing	3
IENG 377	Engineering Economy	3
MAE 241	Statics (minimum grade of C-)	3
MAE 242	Dynamics (minimum grade of C-)	3
MAE 243	Mechanics of Materials (minimum grade of C-)	3
CE Design Electives		6
Choose two of the following:		
CE 411	Pavement Design	
CE 415	Flexible Pavements	
CE 423	Water System Design	
CE 431	Highway Engineering	
CE 447	Environmental Engineering Design	
CE 451	Foundations Engineering	
CE 453	Earthwork Design	
CE 462	Reinforced Concrete Design	
CE 463	Steel Design	
CE 464	Timber Design	
CE 466	Steel Design 2	
CE 468	Building Design	

CE Open Electives: **

Choose five of the following:

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CE 305 & 305L	Introduction to Geomatics and Introduction to Geomatics Laboratory
CE 310	Civil Engineering Materials
CE 322	Hydrotechnical Engineering
CE 413	Construction Methods
CE 414	Construction Engineering
CE 416	Advanced Concrete Materials
CE 417	Infrastructure Asset Management 1
CE 418	Construction Estimating
CE 420	Computational Fluid Mechanics
CE 425	Engineering Hydrology
CE 427	Water Resources Engineering
CE 429	Ecological Engineering
CE 430	Data Analysis in Civil and Environmental Engineering
CE 433	Urban Transportation Planning and Design
CE 434	Public Transportation
CE 435	Railway Engineering
CE 436	Pedestrian/Bike Transportation
CE 439	Traffic Engineering and Operations
CE 443	Environmental Science and Technology
CE 445	Properties of Air Pollutants
CE 454	Geotechnical Engineering Field Methods
CE 461	Structural Analysis 2
CE 493	Special Topics
CE 495	Independent Study
CE 497	Research
SAFM 470	Managing Construction Safety

Engineering/Math/Science Electives ***

Choose three of the following:

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AEM 341 & 341L	General Microbiology and General Microbiology Laboratory
AEM 401 & 401L	Environmental Microbiology and Environmental Microbiology Laboratory
CHEM 215 & 215L	Introductory Analytical Chemistry and Introductory Analytical Chemistry Laboratory
CHEM 231 & 231L	Organic Chemistry: Brief Course and Organic Chemistry: Brief Course Laboratory
GEOG 350 & 350L	Geospatial Problem Solving and Geospatial Problem Solving Lab
GEOL 342	Structural Geology for Engineers
GEOL 488	Environmental Geochemistry
IENG 331	Computer Applications in Industrial Engineering
IENG 350	Introduction to Operations Research
IENG 360	Human Factors Engineering
IENG 445	Project Management for Engineers
IENG 455	Simulation by Digital Methods
MAE 316	Analysis-Engineering Systems
MAE 320	Thermodynamics
MAE 335	Incompressible Aerodynamics
MAE 423	Heat Transfer
MAE 432	Engineering Acoustics

MAE 446	Mechanics of Composite Materials
MAE 473	Bioengineering
MATH 303	Introduction to the Concepts of Mathematics
MATH 318	Perspectives on Mathematics and Science
MATH 341	Introduction to Algebraic Structures
MATH 343	Introduction to Linear Algebra
MATH 375	Applied Modern Algebra
MATH 376	Foundations, Functions and Regression Models
MATH 378	Discrete Mathematics
MATH 420	Numerical Analysis 1
MATH 441	Applied Linear Algebra
MATH 451	Introduction to Real Analysis 1
MATH 456	Complex Variables
MATH 465	Partial Differential Equations
MINE 306	Mineral Property Evaluation
PHYS 211	Introduction to Mathematical Physics
PHYS 314	Introductory Modern Physics
PHYS 321	Optics
PHYS 331	Theoretical Mechanics 1
PHYS 333	Electricity and Magnetism 1
PHYS 376L	Research Methods Laboratory
STAT 312	Intermediate Statistical Methods
STAT 313	Introductory Design and Analysis
STAT 331	Sampling Methods

Additional Requirements

General Science Elective (Select One)		3
AEM 341 & 341L	General Microbiology and General Microbiology Laboratory	
ESWS 202 & 202L	Principles of Soil Science and Principles of Soil Science Laboratory	
BIOL 105 & 105L	Environmental Biology and Environmental Biology Laboratory	
BIOL 115 & 115L	Principles of Biology and Principles of Biology Laboratory	
BIOL 302	Biometry	
CHEM 116 & 116L	Fundamentals of Chemistry 2 and Fundamentals of Chemistry 2 Laboratory	
CHEM 233 & 233L	Organic Chemistry 1 and Organic Chemistry 1 Laboratory	
GEOG 350 & 350L	Geospatial Problem Solving and Geospatial Problem Solving Lab	
GEOL 101 & 101L	Planet Earth and Planet Earth Laboratory	
GEOL 203	Physical Oceanography	
GEOL 342	Structural Geology for Engineers	
PHYS 112 & 112L	General Physics 2 and General Physics 2 Laboratory	

Engineering Elective (outside CEE Dept.) Any 200, 300, 400 level Statler College course not otherwise used- except Civil Engineering courses, Computer Science courses and CHE 310, IENG 213, MAE 331. 3

Total Hours 80

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A grade of D- is permitted in MAE 242 only. Any courses transferred from outside of WVU must be a C- or better.

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Any CE Design Electives or CE 493 that are not otherwise used can also be used.

Any CE 400 level course not otherwise used can also be used.

Suggested Plan of Study

First Year

Fall	Hours	Spring	Hours
MATH 155 (GEF 3)		4 MATH 156 (GEF 8)	4
ENGR 101		2 ENGR 102	3
ENGR 191		1 PHYS 111 & 111L (GEF 8)	4
CHEM 115 & 115L (GEF 2)		4 GEF 6	3
ENGL 101 (GEF 1)		3 GEF 7	3
GEF 5		3	
		17	17

Second Year

Fall	Hours	Spring	Hours
MAE 241		3 MAE 243	3
MATH 251		4 MAE 242	3
CE 210 & 210L		3 MATH 261	4
CE 201		1 STAT 215	3
ENGL 102 (GEF 1)		3 CE 332	3
Select one of the following (GEF 8):		4	
BIOL 115 & 115L			
GEOL 101 & 101L			
		18	16

Third Year

Fall	Hours	Spring	Hours
CE 321		3 CE 351 & 351L	4
CE 347 & 347L		4 CE 301	1
CE 361 & 361L		4 Two CE Open Electives	6
ECON 201 (GEF 4)		3 CE Design Elective	3
WRIT 305		3 ENGR/MATH/Science Elective	3
		17	17

Fourth Year

Fall	Hours	Spring	Hours
CE Design Elective		3 CE Open Elective	3
Two CE Open Electives		6 CE 479	3
General Science Elective		3 Two ENGR/MATH/Science Electives	6
IENG 377		3 ENGR Elective (outside CEE Dept.)	3
		15	15

Total credit hours: 132

Major Learning Outcomes

CIVIL ENGINEERING

Upon graduation, all Bachelors of Science students in Civil Engineering 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.

These outcomes are achieved via rigorous individual courses in all basic areas of chemical engineering, the natural and life sciences, mathematics, humanities, and social sciences. A flexible electives program allows specialization in areas such as environment and safety, polymers and materials, biological processes, and energy processes.

The civil engineering department uses an outcomes-assessment plan for continuous program improvement. The design projects, in conjunction with yearly interviews and questionnaires, provide the measures of learning outcomes. These outcomes-assessment results provide feedback to the faculty to improve teaching and learning processes.