

Environmental Engineering, B.S.

Degree Offered

- Bachelor of Science (B.S.)

Nature of the Program

The environmental engineering degree program fosters cross-disciplinary educational and research collaborations as well as novel approaches to address regional and global environmental issues. The program allows students to choose from different areas of emphasis, including water supply and resources; water quality engineering for human society; air pollution, control, and climate change; and environmental health, risks, and public health. To incorporate real-world training, students will have access to a network of industrial partners that include engineering firms, municipalities, nonprofit organizations and government agencies.

Program Educational Objectives

- The graduates will engage meaningfully and effectively with diverse local, state, and global stakeholders to develop environmental engineering solutions.
- The graduates will behave ethically and responsibly, continue their professional development, and participate fully in their profession and society.
- The graduates will Apply their technical and civic knowledge in developing and implementing sustainable and inclusive solutions that protect public and environmental health.

Degree Requirements

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

- Complete a minimum of 123 credit hours
- Satisfy WVU's undergraduate degree requirements
- Satisfy Statler College's undergraduate degree requirements (<http://catalog.wvu.edu/undergraduate/collegeofengineeringandmineralresources/#policiestext>)
- 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	35
	Environmental Engineering Program Requirements	67
	Total Hours	123

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
BIOL 115 & 115L	Principles of Biology and Principles of Biology Laboratory	4
CHEM 115 & 115L	Fundamentals of Chemistry 1 and Fundamentals of Chemistry 1 Laboratory (GEF 2B)	4
GEOL 101 & 101L	Planet Earth and Planet Earth Laboratory	4
PHYS 111 & 111L	General Physics 1 and General Physics 1 Laboratory (GEF 8)	4
STAT 215	Introduction to Probability and Statistics	3
Total Hours		35

Environmental Engineering Program Requirements

Code	Title	Hours
ENVE 348	Environmental Engineering Processes	3
ENVE 352	Geoenvironmental Engineering	3
ENVE 352L	Introductory Geoenvironmental Laboratory	1
ENVE 449	Sustainable Development Engineering	3
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
ENVE 347 & 347L	Introduction to Environmental Engineering and Introduction to Environmental Engineering Laboratory	4
CE 425	Engineering Hydrology	3
CE 479	Integrated Civil Engineering Design-Capstone	3
ECON 201	Principles of Microeconomics (GEF 4)	3
WRIT 305	Technical Writing	3
IENG 377	Engineering Economy	3
MAE 241	Statics	3
MAE 320	Thermodynamics	3

Design Electives:		6
CE 423	Water System Design	
ENVE 441	Water Treatment Principles and Design	
ENVE 442	Wastewater Treatment	
ENVE 443	Decentralized Wastewater Treatment	
ENVE 447	Air Pollution Control	
Environmental Electives: *		12
ARE 420	Adaptation and Mitigation Strategies for Addressing Climate Change	
CE 427	Water Resources Engineering	
ESWS 355	Environmental Sampling and Analysis	
ENVE 446	Air Pollution and Climate Change	
ENVE 448	Public Health Engineering	
ENVP 415 & 415L	Hazardous Waste Training and Hazardous Waste Training Laboratory	
PNGE 447	Introduction to Carbon Capture and Storage	
PUBH 243	Issues in Environmental Health	
PUBH 337	Climate Change and Public Health	
PUBH 442	Public Health in the Workplace	
Science and Engineering Electives: **		6
AEM 341 & 341L	General Microbiology and General Microbiology Laboratory	
AEM 401 & 401L	Environmental Microbiology and Environmental Microbiology Laboratory	
AGBI 410 & 410L	Introductory Biochemistry and Introduction to Biochemistry Laboratory	
ESWS 415 & 415L	Soil Survey and Land Use and Soil Survey and Land Use Laboratory	
CE 430	Data Analysis in Civil and Environmental Engineering	
CE 453	Earthwork Design	
CE 454	Geotechnical Engineering Field Methods	
CHE 471	Biochemical Engineering	
CHE 472	Biochemical Separations	
CHE 476	Pollution Prevention	
CHEM 116 & 116L	Fundamentals of Chemistry 2 and Fundamentals of Chemistry 2 Laboratory	
CHEM 231 & 231L	Organic Chemistry: Brief Course and Organic Chemistry: Brief Course Laboratory	
DSCI 209	Data Science Pipelines with Python and R	
DSGN 470	Leadership in Energy and Environmental Design Green Building Systems	
ESWS 425 & 425L	Environmental Soil Management and Environmental Soil Management Laboratory	
ESWS 455	Reclamation of Disturbed Soils	
GEOG 350 & 350L	Geospatial Problem Solving and Geospatial Problem Solving Lab	
GEOL 462	Introductory Hydrogeology	
GEOL 463	Physical Hydrogeology	
GEOL 472	Sustainable Energy	
MAE 243	Mechanics of Materials	
MINE 441	Mining Environmental Management	
SAFM 411	General Industry Safety	
RESM 480	Environmental Regulation	

Total Hours

67

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

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Any Environmental Electives that are 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 MATH 261	4
MATH 251		4 ENVE 347 & 347L	4
CE 201		1 STAT 215	3
CE 210 & 210L		3 GEOL 101 & 101L	4
ENGL 102 (GEF 1)		3	
BIOL 115 & 115L		4	
		18	15

Third Year

Fall	Hours	Spring	Hours
CE 321		3 Design Elective	3
MAE 320		3 CE 301	1
IENG 377		3 CE 425	3
ECON 201		3 WRIT 305	3
ENVE 348		3 ENVE 352	3
		ENVE 352L	1
		15	14

Fourth Year

Fall	Hours	Spring	Hours
Design Elective		3 CE 479	3
Environmental Electives		6 Science and Engineering Elective	3
Science and Engineering Elective		3 Environmental Electives	6
ENVE 449		3	
		15	12

Total credit hours: 123

Major Learning Outcomes

ENVIRONMENTAL ENGINEERING

Upon graduation, all Bachelors of Science students in Environmental 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 environmental engineering, the natural and life sciences, mathematics, humanities, and social sciences.

The Wadsworth Department of Civil and Environmental Engineering 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.