ENVIRONMENTAL ENGINEERING, BS

for the degree of Bachelor of Science in Environmental Engineering

Environmental engineers apply basic principles of science, supported by mathematical and computational tools, to address an important issue facing society: ensuring clean air, safe drinking water, and sanitation; evaluating opportunities and designing systems for sustainable environmental resource management; designing infrastructure and developing technologies to enable climate change mitigation and adaptation; protecting people from natural and man-made hazards; and designing sustainable infrastructure that benefits society.

The environmental engineering program comprises five focus areas (Public Health Engineering; One Water; Energy and Environmental Sustainability; Climate and Environmental Sustainability; and Water Systems and Sustainability). Although each area and program has its own special body of knowledge and engineering tools, environmental engineering projects often use knowledge and data from many of these topical areas together in order to address societal challenges. Brief descriptions of each focus area are provided below:

Public Health Engineering (PHE). Students in the PHE primary will gain skills in monitoring and modeling air pollution, air quality management, air, and water pollution control technologies, and physicochemical and toxicological analysis of environmental contaminants. Students will also learn the skills to analyze and evaluate the interconnections between environmental factors and the progression of human diseases through various designs of epidemiological studies and apply the principles of engineering control for the protection of public health.

One Water (OneW). The OneW primary centers on the safe and reliable provision of drinking water, sanitation, and stormwater management for communities and households. Students in this primary will learn physical, chemical, and biological principles and how to apply them to design and develop innovative water quality control processes and systems. Students will also learn how to design resource (water, nutrient, energy) recovery systems to support circular economies. The term “One Water” stems from an international trend toward holistic water planning by municipalities (e.g., “One Water LA” for the City of Los Angeles).

Energy and Environmental Sustainability (E2S). The E2S primary focuses on understanding, quantifying, and modeling the interdependencies between energy, water, and the environment. Students will gain fundamental and applied knowledge in thermodynamics and chemical principles, and expertise in water policy, renewable energy systems, and sustainable design.

Climate and Environmental Sustainability (CES). CES students will develop skills to quantify and manage the dynamic interactions among society and the built and natural environments, with an emphasis on environmental and water resources engineering to adapt to a changing global climate. Coursework will focus on atmospheric sciences (including physical climate and physical meteorology), natural resource economics, environmental systems analyses, decision and risk analysis, and data science to generate insight from large and complex datasets.

Water Systems and Sustainability (WS2). The WS2 primary focuses on understanding, designing, and managing natural and engineered water systems. Students learn foundational knowledge of environmental hydrology and hydraulic engineering, and gain skills to develop sustainable solutions to urban water challenges such as flooding, to manage surface water and groundwater transport and pollution, and to design novel nature-based solutions and green and hybrid infrastructure to overcome the challenges imposed by a changing environment.

Across all focus areas, CEE’s Program Education Objectives are to educate EnvE students to:

1. Successfully enter the environmental engineering profession as practicing engineers and consultants with prominent companies and organizations in diverse areas that include public health engineering, one water, energy and environmental sustainability, climate and environmental sustainability, and water systems and sustainability.
2. Pursue graduate education and research at major research universities in environmental engineering, and related fields.
3. Pursue professional licensure.
4. Advance to leadership positions in their profession.
5. Engage in continued learning through professional development.
6. Participate in and contribute to professional societies and community service.

Program Review and Approval
To qualify for the degree of Bachelor of Science in Environmental Engineering, each student's academic program plan must be reviewed by a standing committee of the faculty (the Program Review Committee) and approved by the Associate Head of Civil and Environmental Engineering in charge of undergraduate programs. This review and approval process ensures that individual programs satisfy the educational objectives and all of the requirements of the environmental engineering program, that those programs do not abuse the substantial degree of flexibility that is present in the curriculum, and that the career interests of each student are cultivated and served.

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Graduation Requirements
Minimum Overall GPA: 2.0
Minimum hours required for graduation: 128 hours

General education: Students must complete the Campus General Education requirements including the campus general education language requirement. ECE 316 will satisfy an an Orientation and Professional Development requirement, a Campus General Education Humanities requirement, and the Campus General Education Advanced Composition requirement.

Orientation and Professional Development

Code	Title	Hours
CEE 190	Project-Based Introduction to CEE	4
CEE 495	Professional Practice	0
ECE 316	Ethics and Engineering	3
ENG 100	Grainger Engineering Orientation Seminar (External transfer students take ENG 300.)	1
Total Hours		**8**

Foundational Mathematics and Science

Code	Title	Hours
ATMS 202	General Physical Climate	3
CHEM 102	General Chemistry I	3
CHEM 103	General Chemistry Lab I	1
CHEM 104	General Chemistry II	3
CHEM 105	General Chemistry Lab II	1
MATH 221	Calculus I (MATH 220 may be substituted. MATH 220 is appropriate for students with no background in calculus. 4 of 5 credit hours count towards degree.)	4
MATH 231	Calculus II	3
MATH 241	Calculus III	4
MATH 257	Linear Algebra with Computational Applications	3
MATH 285	Intro Differential Equations	3
PHYS 211	University Physics: Mechanics	4
Total Hours		**32**

Environmental Engineering Technical Core

Code	Title	Hours
CEE 201	Systems Engrg & Economics	3
CEE 202	Engineering Risk & Uncertainty	3
CEE 330	Environmental Engineering	3
CEE 331	Fluid Dynamics in the Natural and Built Environment (Fluid Dynamics in the Environment)	4
CEE 350	Water Resources Engineering	3
CEE 449	Environmental Engineering Lab	3
CEE 453	Urban Hydrology and Hydraulics	4
CS 101	Intro Computing: Engrg & Sci	3
SE 101	Engineering Graphics & Design	3
TAM 211	Statics	3
TAM 212	Introductory Dynamics	3
Total Hours		**35**

Primary Fields (Students choose one of five (5) Primary Fields)

Code	Title	Hours
Energy & Environmental Sustainability Primary Field		**30**
ABE 436	Renewable Energy Systems	4
CEE 340	Energy and Global Environment	3
CEE 433	Water Technology and Policy	3
CEE 493	Sustainable Design Eng Tech	4
CHEM 232	Elementary Organic Chemistry I	3
CHEM 360	Chemistry of the Environment	3
ENSU 301	Soc Impacts Weather & Climate	3
ME 200	Thermodynamics	3
PHYS 212	University Physics: Elec & Mag	4
Climate & Environmental Sustainability Primary Field		**31**
ACE 310	Natural Resource Economics	3
ATMS 201	General Physical Meteorology	3
CEE 340	Energy and Global Environment	3
CEE 434	Environmental Systems I	3
CEE 458	Water Resources Field Methods	4
CEE 491	Decision and Risk Analysis	3
CEE 492	Data Science for Civil and Environmental Engineering	3
ECON 102	Microeconomic Principles	3
or ACE 100	Introduction to Applied Microeconomics	
GGIS 379	Introduction to Geographic Information Systems	4
PHYS 213	Univ Physics: Thermal Physics	2
Water Systems & Sustainability Primary Field		**32**
ACE 310	Natural Resource Economics	3
ATMS 201	General Physical Meteorology	3
CEE 433	Water Technology and Policy	3
CEE 434	Environmental Systems I	3
CEE 450	Surface Hydrology	3
or CEE 457	Groundwater	
CEE 451	Environmental Fluid Mechanics	3
CHEM 232	Elementary Organic Chemistry I	3
CHEM 360	Chemistry of the Environment	3
ECON 102	Microeconomic Principles	3
or ACE 100	Introduction to Applied Microeconomics	
ENSU 301	Soc Impacts Weather & Climate	3
PHYS 213	Univ Physics: Thermal Physics	2
Public Health Engineering Primary Field		**30**
ATMS 305	Computing and Data Analysis	3
CEE 435	Public Health Engineering	3
CEE 437	Water Quality Engineering	3
CEE 438	Science & Environmental Policy	3
CEE 441	Air Pollution Sources, Transport and Control	4
CHLH 201		
CHLH 274		3
CHLH 469		3
MCB 300	Microbiology	3
PHYS 213	Univ Physics: Thermal Physics	2
One Water Primary Field		**29-30**
CEE 437	Water Quality Engineering	3
CEE 440	Fate Cleanup Environ Pollutant	3 or 4
or CEE 452	Hydraulic Analysis and Design	
CEE 442	Environmental Engineering Principles, Physical	4
CEE 444	Env Eng Principles, Biological	4
CHBE 221	Principles of CHE	3
CHBE 321	Thermodynamics	4
CHEM 232	Elementary Organic Chemistry I	3
CHEM 360	Chemistry of the Environment	3
PHYS 213	Univ Physics: Thermal Physics	2

Free Electives

Code	Title	Hours
Additional course work, subject to the Grainger College of Engineering restrictions to Free Electives, so that there are at least 128 credit hours earned toward the degree. (https://go.grainger.illinois.edu/FreeElectives/)		10-14
Total Hours of Curriculum to Graduate		**128**

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Sample Sequence

This sample sequence is intended to be used only as a guide for degree completion. All students should work individually with their academic advisors to decide the actual course selection and sequence that works best for them based on their academic preparation and goals. Enrichment programming such as study abroad, minors, internships, and so on may impact the structure of this four-year plan. Course availability is not guaranteed during the semester indicated in the sample sequence.

Students must fulfill their Language Other Than English requirement by successfully completing a third level of a language other than English. This sample curriculum plan makes the assumption that the foreign language graduation requirement has been satisfied by completing three years of study of a single foreign language in high school.

Free Electives: Additional course work, subject to the Grainger College of Engineering restrictions to Free Electives, so that there are at least 128 credit hours earned toward the degree.

First Year

First Semester	Hours	Second Semester	Hours
CEE 190	4	MATH 231	3
ENG 100	1	CHEM 104	3
MATH 221 (MATH 220 may be substituted)	4	CHEM 105	1
CHEM 102	3	PHYS 211	4
CHEM 103	1	CS 101	3
Composition I or SE 101	4-3	SE 101 or Composition I course	3-4
	17		**17**

Second Year

First Semester	Hours	Second Semester	Hours
CEE 201	3	CEE 202	3
MATH 241	4	TAM 211	3
MATH 257	3	Primary field course	3
ATMS 202	3	Primary field course	2
General Education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)	3	Language Other Than English (3rd level) course	4
	16		**15**

Third Year

First Semester	Hours	Second Semester	Hours
CEE 331	4	MATH 285	3
TAM 212	3	ECE 316 (Fulfils Humanities and Advanced Composition general education requirements)	3
CEE 330	3	CEE 350	3
Primary field course	3	Primary field course	3
Primary field course	3	General Education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)	3
	16		**15**

Fourth Year

First Semester	Hours	Second Semester	Hours
CEE 495	0	CEE 449	3
Primary field course	3	CEE 453	4
Primary field course	3	Primary field course	3
Primary field course	3	Free elective course	3
Primary field course	4	Free elective course	3
General Education course (choose a Humanities or Social/Behavioral Science course with Cultural Studies designation)	3		
	16		**16**

Total Hours 128

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Educational objectives for the environmental engineering program reflect the mission of the Department of Civil and Environmental Engineering, the importance placed on successful professional practice, the ability to pursue advanced degrees, the assumption of professional and societal leadership roles, and a commitment to lifelong learning. University of Illinois B.S. in Environmental Engineering graduates will:

1. Successfully enter the environmental engineering profession as practicing engineers and consultants with prominent companies and organizations in diverse areas that include public health engineering, one water, energy and environmental sustainability, climate and environmental sustainability, and water systems and sustainability.
2. Pursue graduate education and research at major research universities in environmental engineering and related fields.
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Civil & Environmental Engineering Website (https://cee.illinois.edu/directory/faculty/)
Civil & Environmental Engineering Faculty

The Grainger College of Engineering Admissions (https://grainger.illinois.edu/admissions/)
The Grainger College of Engineering (https://grainger.illinois.edu/)