

## Environmental Engineering

### Department of Civil, Structural, and Environmental Engineering

Environmental Engineering  
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#### Overview

Environmental engineers work at the interface of society and the environment, striving to protect both human and ecosystem health. Among the top priorities of the profession are the delivery of safe water to drink and clean air to breathe, and the restoration of water quality in the Great Lakes, the Hudson River and water bodies throughout the nation. Today, environmental engineers face issues that include the detection and treatment of new pollutants and pathogens, threats of terrorism to our nation's water supplies, the global cycling of pollutants, global warming, and energy. Because they often work in the public arena, environmental engineers require broad technical training and strong communication skills, and they usually must be licensed as professional engineers.

The undergraduate program in environmental engineering at the University at Buffalo prepares students for professional practice and eventual licensure as professional engineers. The BS curriculum includes introductory-level knowledge of the environmental issues associated with air, land, and water systems and environmental health impacts. The curriculum includes math, science and basic engineering courses in the freshman and sophomore years; required engineering courses in the junior and senior years; and technical elective courses taken in the senior year. Laboratories in environmental engineering are included in two lab classes in the junior year. Students have considerable flexibility in the selection of technical electives, with approved electives in engineering, biology, chemistry, geology, economics, geography, and the social sciences.

Program educational objectives for the environmental engineering BS degree are:

- Employment and promotion as environmental engineers in consulting, industry, government, academia, and related professions;
- Maintain state-of-the-art knowledge through lifelong learning, such as graduate study and continuing education;
- Respond to the changing impact of environmental engineering solutions in a global and social context, and;
- Advance and support the engineering profession through participation in professional societies, civic groups, and educational institutions.

#### About our Degrees

The BS degree in environmental engineering is accredited by the Accreditation Board of Engineering and Technology (ABET) and prepares students for graduate study and/or professional practice. Graduate degrees (MS, ME, and PhD) are formally granted in civil engineering, but focus on environmental engineering as well as other areas of specialization.

#### **Acceptance Criteria**

Please see the School of Engineering and Applied Sciences entry in the Undergraduate Catalog, <http://undergrad-catalog.buffalo.edu/academicprograms/eas.shtml>.

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#### **Degree Requirements**

Please see [Degrees and Policies](#).

#### About our Courses

## Environmental Engineering

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### The typical class size for:

Freshman/introductory courses is: 100+  
Sophomore/intermediate courses is: 50-100  
Upper level required courses is: 20-60  
Upper level electives is: 10-15

### In the Department of Civil, Structural, and Environmental Engineering, what do teaching assistants (TAs) do?

Teaching assistants hold office hours to answer students' questions about homework and exam preparation, grade homework (exams are usually graded by instructors), and manage lab assignments.

### About our Faculty

We have 23 full-time faculty (all with PhD degrees) and approximately 10 adjunct faculty. The faculty is actively engaged in teaching, research, and service and has won many honors and awards, including:

- Three SUNY Chancellor's Awards for Excellence in Teaching
- Four National Science Foundation Presidential Young Investigator awards
- One Office of Naval Research Young Investigator Awards/Career Awards
- One SUNY Chancellor's Award for Excellence in Scholarship and Creative Activity
- One SUNY Distinguished Professor
- Two ASCE Newmark Medals

See a list of our [Undergraduate Faculty](#).

### Transfer Policy

For the transfer policy, please see the School of Engineering and Applied Sciences entry in the Undergraduate Catalog, <http://undergrad-catalog.buffalo.edu/academicprograms/eas.shtml>.

### Extracurricular Activities

Our undergraduate students are engaged in many campus-wide activities and organizations. Student organizations specific to engineering include the following:

- [Air and Waste Management Association \(AWMA\)](#)
- [American Society of Civil Engineers \(ASCE\)](#)
- [Engineers for a Sustainable World \(ESW\)](#)
- [National Society of Professional Engineers \(NSPE\)](#)
- [Society of Women Engineers\(SWE\)](#)
- [Tau Beta Pi \(Engineering honor society\)](#)
- [UB Environmental Engineering and Science Club \(UBEESC\)](#)
- [Water Environment Federation \(WEF\)](#)

See the [UB Student Association](#).

### Career Information and Further Study

Environmental engineers work to understand the processes that transport and transform contaminants in both the natural environment (air, water, and land) and engineered environment (treatment plants and industry). Some specific examples include global warming, the movement of contaminants such as pesticides through a watershed, the uptake of toxic mercury by fish in the Great Lakes, the movement of strontium in

## Environmental Engineering

groundwater, and the removal of disease-causing organisms by ultraviolet light in drinking water.

Environmental engineers choose from a broad spectrum of employment opportunities in private consulting firms (in which environmental engineers often participate as owners or partners), industry, governmental agencies, research/development, and education. Some graduates return immediately or within a few years to graduate school for advanced studies. BS (Environmental) graduates have the skills and most prerequisites to pursue further education in law, medicine, management or other professional fields.

Environmental engineering jobs are diverse and include consulting engineering firms, government, and industry. Here is a partial list of companies who recruit students from the University at Buffalo's Environmental Engineering program: ALCOA, Buffalo Sewer Authority, CH2M Hill, DuPont, Ecology and Environment, Inc., Erie County Water Authority, Malcolm Pirnie, Inc., NYS Department of Environmental Conservation, Parsons Engineering Science, Stearns and Wheler, URS Corp., and the U.S. Army Corps of Engineers.

### Career Hints

Degree level required: A significant number of employers require or reward an MS or ME degree for environmental engineering jobs. Thus, some students continue their studies at the graduate level.

The best way to ensure a good starting salary is to intern with an environmental-related firm before graduation, earn competitive grades, or participate in undergraduate research with a faculty member.

### Salary Trends

Average starting salary: \$53,000

Factors influencing salary: Educational level, experience, specialization, GPA, location, computer skills, and many other factors. The best way to ensure a good starting salary is to intern with an environmental engineering-related firm before graduation, earn a competitive GPA, and do undergraduate research with a faculty member.

### Additional Resources

- [American Academy of Environmental Engineers](#)
- [EE-Link: The Environmental Education Web server](#)
- [Environmental Career Opportunities](#)
- [Environmental Careers Organizations](#)
- [Environmental Career.com](#)
- [Environmental Jobs and Careers](#)
- [Institute of Professional Environmental Practice](#)
- [U.S. Environmental Protection Agency](#)

### Degree Options

In addition to the BS degree in environmental engineering, the Department of Civil, Structural and Environmental Engineering offers programs leading to a BS degree in civil engineering, the master of engineering (ME) degree, the master of science (MS) degree, and the doctor of philosophy (PhD) degree.

### Degrees Offered

Undergraduate: BS

### Links to Further Information About this Program

- [Undergraduate Catalog](#)
- [Undergraduate Admissions](#)
- [Graduate Admissions](#)
- [Department of Civil, Structural and Environmental Engineering](#)
- [School of Engineering and Applied Sciences](#)

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### Environmental Engineering - B.S.

#### Acceptance Criteria

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#### Required Courses

BIO 309 Ecology  
CHE 107 General Chemistry for Engineers  
CHE 108 General Chemistry for Engineers  
CHE 203 Organic Chemistry I  
CIE 303 Geodesy, GPS, and GIS  
CIE 308 Engineering Statistics  
CIE 334 Soil Mechanics  
CIE 340 Environmental Engineering  
CIE 343 Hydraulic Engineering  
CIE 354 Fluid Mechanics  
CIE 360 Environmental Engineering Laboratory  
CIE 362 Civil Engineering Laboratory II  
CIE 415 Professional Practice Issues  
CIE 441 Ecological Engineering  
CIE 442 Treatment Process Engineering  
CIE 444 Hydrologic Engineering  
CIE 445 Groundwater Engineering  
CIE 447 Sustainability Practicum  
CIE 448 Chemical Principles in Environmental Engineering  
CIE 449 Environmental Engineering Design  
CIE 469 Hazardous Waste Management  
EAS 140 Engineering Solutions  
EAS 202 Engineering Impact on Society  
EAS 207 Statics  
EAS 209 Mechanics of Solids  
GLY 414 Hydrogeology  
MAE 177 Introduction to Engineering Drawing and CAD  
MIC 301 Biomedical Microbiology or BIO 201 Cell Biology  
MTH 141 College Calculus I  
MTH 142 College Calculus II  
MTH 241 College Calculus III  
MTH 306 Introduction to Differential Equations  
PHY 107 General Physics I  
Three technical electives

#### Summary

Total credit hours for the major: 111

See [Baccalaureate Degree Requirements](#) for general education and remaining university requirements.

#### Recommended Sequence of Program Requirements

##### FIRST YEAR

Fall CHE 107, EAS 140, MTH 141

Spring EAS 202, CHE 108, MAE 177, MTH 142, PHY 107

##### SECOND YEAR

Fall CHE 203, CIE 303, EAS 207, MTH 241

Spring CIE 340, EAS 209, MIC 301 or BIO 201, MTH 306

##### THIRD YEAR

Fall BIO 309, CIE 354, CIE 360, CIE 441, CIE 308, GLY 414

Spring CIE 334, CIE 343, CIE 362, one technical elective, CIE 442

##### FOURTH YEAR

Fall CIE 444, CIE 447, CIE 448, CIE 469, CIE 415

Spring CIE 445, CIE 449, two technical electives

#### Electives and Course Groupings

## Environmental Engineering

Only three credits of the informal courses ([CIE 498](#), [CIE 499](#), [EAS 396](#), and [EAS 496](#)) can be counted as a technical elective toward fulfillment of degree requirements.

### Approved Technical Electives

[BIO 200](#) Evolutionary Biology  
[BIO 201](#) Cell Biology (if [MIC 301](#) Fundamentals of Microbiology is taken as required course)  
[BIO 452](#) Limnology  
[CE 304](#) Chemical Engineering Thermodynamics  
[CE 318](#) Transport Processes II  
[CE 429](#) Chemical Engineering Reaction Kinetics  
[CHE 204](#) Organic Chemistry II  
[CHE 214](#) Introduction to Analytical Chemistry  
[CHE 215](#) Introduction to Analytical Chemistry Lab  
[CHE 334](#) Physical Chemistry for Chemical Engineers  
[CHE 413](#) Instrumental Analysis  
[CHE 470](#) Analytical Chemistry of Pollutants  
[CIE 404](#) Civil Engineering Internship  
[CIE 406-CIE 408](#) Co-Op Work Experience  
[CIE 458](#) Introduction to Geoenvironmental Engineering  
[CIE 461](#) Air Pollution  
[CIE 493](#) Project Management  
[EAS 230](#) Higher-Level Language  
[EAS 396](#) Engineering Career Institute (1 credit)  
[EAS 480](#) Technical Communications for Engineers  
[EAS 496](#) Engineering Co-op (2 credits)  
[ECO 405](#) Microeconomic Theory  
[ECO 407](#) Macroeconomic Theory  
[ECO 412](#) Environmental Economics  
[EE 200](#) EE Concepts/Nonmajors  
[GEO 481](#) Geographic Information Systems  
[GEO 484](#) GIS Applications  
[GEO 486](#) Spatial Decision-Support Systems  
[GLY 419](#) Environmental Geophysics  
[IE 320](#) Engineering Economy  
[MIC 301](#) Fundamentals of Microbiology (if [BIO 201](#) Cell Biology is taken as required course)  
[MAE 204](#) Thermodynamics  
[SSC 315](#) Field Ecology  
[SSC 317](#) Environmental Politics  
[SSC 326](#) Great Lakes Ecology  
[SSC 360](#) Environmental Impact Statements  
[SSC 385](#) Energy, Environment and Society