ENVIRONMENTAL ENGINEERING

**Director of undergraduate studies:** John Fortner (john.fortner@yale.edu); seas.yale.edu/departments/chemical-and-environmental-engineering

Environmental engineering encompasses the scientific assessment and development of engineering solutions to environmental problems affecting land, water, and air (the biosphere). The field addresses broad environmental issues, including the safety of drinking water, groundwater protection and remediation, wastewater treatment, indoor and outdoor air pollution, climate change, solid and hazardous waste disposal, cleanup of contaminated sites, the prevention of pollution through product and process design, and strategies for sustainable water and energy use and production.

Environmental engineers must balance competing technical, social, and legal issues concerning the use of environmental resources. Because of the complexity of these challenges, environmental engineers need a broad understanding not only of engineering disciplines but also of chemistry, biology, geology, and economics. Accordingly, the program allows students in the major to select an emphasis on environmental engineering technology, sustainability, global health, economics, or energy and climate change. The program prepares students for leadership positions in industry and government agencies or for further studies in engineering, science, business, law, and medicine.

Two degree programs are offered: the B.S. in Environmental Engineering, and the B.A. in Engineering Sciences (Environmental). The B.S. degree program in Environmental Engineering is designed for students who desire a strong background in environmental engineering leading to a career in the field. The B.A. degree program in Engineering Sciences (Environmental) is intended for students whose careers will involve, but not be dominated by, the skills of environmental engineering. The B.A. program is appropriate for those contemplating a career in which scientific and technological problems can play an important role, as is often the case in law, business, medicine, or public service.

**PREREQUISITES**

**B.A. degree program in Engineering Sciences (Environmental)** The B.A. degree program requires MATH 112 and 115; a two-term lecture sequence in chemistry; and PHYS 170, 171.

**B.S. degree program in Environmental Engineering** The B.S. degree program has the following prerequisites in mathematics and basic sciences: MATH 112, 115; MATH 120 or ENAS 151; ENAS 194; a two-term lecture sequence in chemistry, with corresponding labs; PHYS 180, 181; and BIOL 101 and 102 or BIOL 103 and 104.

**REQUIREMENTS OF THE MAJOR**

**B.A. degree program** The B.A. degree program requires nine term courses beyond the prerequisites, including the senior requirement. Students take ENVE 120, 360, and either ENVE 373 or 377. Five electives must be chosen in consultation with the director of undergraduate studies (DUS).

**B.S. degree program** The B.S. degree program requires at least twelve term courses beyond the prerequisites, including the senior requirement. Students take CENG 300 or MENG 211; ENVE 120, 360, 373, 377; ENVE 315 or 448; EVST 444 or ENVE 438; and MENG 361 or ENAS 646. At least three technical electives must be chosen in consultation with the DUS.

**Credit/D/Fail** No course taken Credit/D/Fail may count toward the major, including prerequisites.

**SENIOR REQUIREMENT**

**B.A. degree program** Students in the B.A. program must pass ENVE 416 or ENVE 490 in their senior year.

**B.S. degree program** Students in the B.S. program must pass ENVE 416 or ENVE 490 in their senior year.

**REQUIREMENTS OF THE MAJOR**

**ENGINEERING SCIENCES (ENVIRONMENTAL), B.A.**

**Prerequisites** MATH 112, 115; two-term lecture sequence in chemistry; PHYS 170, 171

**Number of courses** 9 term courses beyond prereqs (incl senior req)

**Specific courses required** ENVE 120; 360; and ENVE 373 or 377

**Distribution of courses** 5 electives approved by DUS

**Senior requirement** ENVE 416 or ENVE 490

**ENVIRONMENTAL ENGINEERING, B.S.**

**Prerequisites** MATH 112, 115; MATH 120 or ENAS 151; ENAS 194; two-term lecture sequence in chemistry, with labs; PHYS 180, 181; BIOL 101 and 102 or BIOL 103 and 104

**Number of courses** 12 term courses beyond prereqs (incl senior req)

**Specific courses required** CENG 300 or MENG 211; ENVE 120, 360, 373, 377; ENVE 315 or 448; EVST 444 or ENVE 438, and MENG 361 or ENAS 646

**Distribution of courses** 3 technical electives approved by DUS
Senior requirement  ENVE 416 or ENVE 490

Environmental engineers are involved with many aspects of society's interaction with the environment. The field embraces broad environmental concerns, including the safety of drinking water, groundwater protection and remediation, wastewater treatment, indoor and outdoor air pollution, solid and hazardous waste disposal, cleanup of contaminated sites, preservation of sensitive wetlands, energy and the environment, and prevention of pollution through product and process design. Environmental engineers must balance technical, social, economic, and legal issues concerning the use of environmental resources. Consequently, they need a broad understanding not only of engineering disciplines but also of chemistry, biology, geology, economics, and management.

Students majoring in Environmental Engineering select an emphasis on environmental engineering technology, sustainability, global health, energy and climate change, or economics. The major prepares students for leadership positions in industry and government agencies. Graduates may also continue with further studies in engineering, science, business, law, and medicine.

Students interested in the major should take the following course during the first year:

- ENVE 120, Introduction to Environmental Engineering

One of the following math courses:

- MATH 112, Calculus of Functions of One Variable I
- MATH 115, Calculus of Functions of One Variable II
- MATH 120, Calculus of Functions of Several Variables

One of the following chemistry sequences:

- CHEM 161, General Chemistry I and CHEM 165, General Chemistry II
- CHEM 163, Advanced University Chemistry I and CHEM 167, Advanced University Chemistry II

Information can be found on the Chemical and Environmental Engineering website. The director of undergraduate studies (DUS) welcomes consultation with students about the program at any time.

FACULTY ASSOCIATED WITH THE PROGRAM IN ENVIRONMENTAL ENGINEERING

Professors  Paul Anastas (Forestry & Environmental Studies), Michelle Bell (Forestry & Environmental Studies), Ruth Blake (Geology & Geophysics), Menachem Elimelech (Chemical & Environmental Engineering), Edgar Hertwich (Forestry & Environmental Studies), Edward Kaplan (School of Management), Jaehong Kim (Chemical & Environmental Engineering), Jordan Peccia (Chemical & Environmental Engineering), Lisa Pfefferle (Chemical & Environmental Engineering), Julie Zimmerman (Chemical & Environmental Engineering)

Associate Professors  John Fortner (Chemical & Environmental Engineering), Drew Gentner (Chemical & Environmental Engineering)

View Courses

Courses

[ ENVE 373, Air Pollution Control ]
[ ENVE 448, Environmental Transport Processes ]
[ ENVE 473, Air Quality and Energy ]