Environmental Engineering

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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.

Students are held to the requirements in place when they declared their major. However, with approval from the director of undergraduate studies (DUS), the following prerequisites and major requirements, updated for the academic year 2023-2024, may be fulfilled by students who declared the major in a prior term.

PREREQUISITES

B.A. degree program in Engineering Sciences (Environmental) The B.A. degree program requires MATH 1120 and MATH 1150; a two-term lecture sequence in chemistry; and PHYS 1700, 1710.

B.S. degree program in Environmental Engineering The B.S. degree program has the following prerequisites in mathematics and basic sciences: MATH 1120, MATH 1150; MATH 1200 or ENAS 1510; ENAS 1940; ENAS 1300 or S&DS 2300; a two-term lecture sequence in chemistry, with corresponding labs; PHYS 1800, 1810; BIOL 1010 and BIOL 1020 or BIOL 1030 and 1040.

REQUIREMENTS OF THE MAJOR

B.A. degree program The B.A. degree program requires nine term course credits beyond the prerequisites, including the senior requirement. Students take ENVE 1200, ENVE 3600, and either ENVE 3730 or 3770. Five electives must be chosen in consultation with the director of undergraduate studies (DUS). Elective courses may build toward an optional concentrated area of emphasis, including (a) Climate and Energy, (b) Environmental Science and Technology, (c) Sustainability and Policy, and (d) Self-designed.

B.S. degree program The B.S. degree program requires at least thirteen term course credits beyond the prerequisites, including the senior requirement. Students take CENG 3000 or MENG 2511; ENVE 1200; 3600; 3730; 3140 or 4480; 4380; 4410; and ENVE 6420. At least four electives must be chosen in consultation with the DUS; of these, three must be technical electives. Elective courses may build toward an optional concentrated area of emphasis, including (a) Climate and Energy, (b) Environmental Science and Technology, (c) Sustainability and Policy, and (d) Self-designed.

Credit/D/Fail No course taken Credit/D/Fail may be applied toward the requirements of the major, including prerequisites.

Outside credit Courses taken at another institution or during an approved summer or term-time study abroad program may count toward the major requirements with DUS approval

SENIOR REQUIREMENT

B.A. degree program Students in the B.A. program must pass ENVE 4160 or ENVE 4900 in their senior year.

B.S. degree program Students in the B.S. program must pass ENVE 4160 or ENVE 4900 in their senior year.

SUMMARY OF MAJOR REQUIREMENTS

ENGINEERING SCIENCES (ENVIRONMENTAL), B.A.

Prerequisites MATH 1120, 1150; two-term lecture sequence in chemistry; PHYS 1700, 1710

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

Specific courses required ENVE 1200; ENVE 3600; and ENVE 3730 or 3770

Distribution of courses 5 electives approved by DUS

Senior requirement ENVE 4160 or ENVE 4900

ENVIRONMENTAL ENGINEERING, B.S.

Prerequisites MATH 1120, MATH 1150; MATH 1200 or ENAS 1510; ENAS 1940; ENAS 1300 or S&DS 2300; two-term lecture sequence in chemistry, with labs; PHYS 1800, 1810; BIOL 1010 and BIOL 1020 or BIOL 1030 and BIOL 1040

Number of courses 13 term courses beyond prereqs (incl senior req)

Specific courses required CENG 3000 or MENG 2511; ENVE 1200; 3600; 3730; 3140 or 4480; 4380; 4410; 6420

Distribution of courses 4 electives approved by DUS, three of which must be technical electives

Senior requirement ENVE 4160 or ENVE 4900

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)*