ENVIRONMENTAL SCIENCE PROGRAM

Director: *Linda Schweitzer (Chemistry)*

Environmental Science Program Advisory Council: *Terry Begnoche, Getnet Bekele (History), Judith K. Brown (Anthropology), Phil Clampett (Biological Sciences), Fay Hansen (Biological Sciences), Cora Hanson, Jim Leidel, Emmett Lombard (Political Science), Domenico Luongo, Charles Mabee, Don Mayer (School of Business Administration), Charles McGlothlin (School of Health Sciences), Mark Rigstad (Philosophy), William Robert, Richard Rozek (School of Health Sciences), Linda Schweitzer (Chemistry), John Seeley (Chemistry), Cole Shoemaker, Douglas Thiel, Paul Tomboulian (Distinguished Professor of Chemistry, Emeritus), Wendy Wilson*

Designed to integrate applied scientific specialties within the broad field of environmental science, the environmental science curricula prepare students for a variety of professional opportunities in government as well as the private sector, and for graduate study in such fields as toxic substance management, public health, toxicology, pharmacology, industrial hygiene and environmental planning.

Graduates of the program should be able to identify and evaluate a broad range of environmental problems. In addition, they should be able to offer solutions, anticipate hazards and prevent future problems. Studies include such areas as health in the workplace, toxic substance regulations, applied ecology, pollution prevention, air resources, water resources and public environmental policy.

Requirements for the B.S. degree

To earn a Bachelor of Science degree with a major in environmental science, students must complete a minimum of 128 credits:

1. An introductory prerequisite core of a minimum of 35 credits, to be completed with a 2.00 grade point average before major standing is awarded, including:
   a. BIO 111, 113, 116 Biology and Biology Laboratory;
   b. CHM 157, 158 General Chemistry I and II, or
      CHM 167, 168 Honors General Chemistry I and II;
   c. PHY 151, 152 Introductory Physics I and II or
      PHY 101, 102 General Physics I and II (for students not considering graduate work);
   d. 8 credits of mathematics above MTH 121 or 141 (usually including STA 225; MTH 154 strongly recommended; MTH 155 recommended for students considering graduate work).

2. Core requirements of a minimum of 28 credits including:
   a. BIO 301 Ecology;
   b. CHM 325 Analytical Chemistry;
   c. ENV 308 Introduction to Environmental Studies;
   d. ENV 355 Public and Environmental Health;
   e. ENV 368 or 386 Fundamental of Hazardous Materials Regulations or Principles of Occupational Health;
   f. ENV 452 Environmental Management Systems;
   g. ENV 461 Environmental Law and Policies.
   h. ENV 470 Environmental Science Internship (*Satisfies the requirements for the capstone experience and writing intensive in the major*).

3. Major standing must be achieved three semesters before graduation, and before a student reaches senior status, otherwise graduation may be delayed.

4. Complete one of the specializations described below. Specialization includes a minimum of 26 credits, and must be approved by the program director. Students desiring to complete two specializations must take 16 credits of non-duplicative course work. At least 16 of the credits taken at the 300 level or above must be taken at Oakland University.

Specialization in occupational health and safety (*26 credits*)

Based upon an extensive curriculum planning study, this option combines environmental and occupational health perspectives in scientific and technical courses designed to provide pre-professional training for careers relating human health and safety factors to working conditions. Students learn to recognize, evaluate and control actual and potential environmental hazards, especially undesirable occupational health and safety conditions and practices. The option emphasizes environmental and occupational toxicology.

Required course work includes:
BIO 207 or 321;
CHM 234-235;
ENV 387, 388, 474.

Recommended electives include:
BIO 325 or CHM 453;
ENV 342, 364, 368, 486; PS/ENV 354; OSH 445.
Elective courses for the specialization must be approved by the program director.

Specialization in public health (*26 credits*)

This option emphasizes the protection of human health through the management, control, and prevention of environmental factors that may adversely affect human health. Many opportunities exist at local and state levels of government to improve health and environmental quality, focusing on toxic substance control, food protection, water quality and waste management.

Required course work includes:
BIO 207 or 321;
BIO 307 or 319;
CHM 234-235;
ENV/OSH 446.

Recommended electives include:
BIO 205, 423;
CHM 410, 412, 413;
ENV 364, 368, 373, 386, 388, 452, 485, 486; PS 302, 350, 353 or PS/ENV 354;
Elective courses for the specialization must be approved by the program director.

Specialization in environmental and resource management (*26 credits*)

This option emphasizes the wise use of resources, especially as they affect human health and well-being. Program electives offer training for a variety of field and laboratory opportunities including planning, resource management, environmental protection and public policy.

1. Required course work includes:
   ENV 312, 373;
   PS 302 or 350 or PS/ENV 354.
2. Recommended electives include:
   BIO 207 or 321, 303, 311, 327, 373;
   CHM 201 or 234-235; CHM 410, 412, 413;

AN/ENV 322; ECN/ENV 410; ENV 364, 368, 373, 386, 389, 410, 485, 486.
Elective courses for the specialization must be approved by the program director.

Specialization in toxic substance control (*26 credits*)

This option is designed to provide training for professional opportunities in environmental toxicology, environmental health chemistry, and toxic substance management. The major focus is on toxicological principles and their applications to the production, distribution and release of toxic substances, especially as they may cause environmental problems. Risk assessment, problem solving and legislative compliance are emphasized.

Required course work includes:
CHM 234-235;
BIO 325 or CHM 453;
ENV 486; ENV/OSH 446;

Recommended electives include:
BIO 207 or 321;
CHM 410, 342, 412, 413, 454;
ENV 364, 368, 386, 387, 388, 474, 485, 486; PS 302, 353, PS/ENV 354.
Elective courses for the specialization must be approved by the program director.

Requirements for the liberal arts minor in environmental science

The following 22 credits are required for this minor: ENV 308, 355, or 373 or 452, 368 or 461, or 485 or 486 plus six credits of approved electives. An approved Concentration/Minor Authorization Form must be filed three semesters prior to graduation.

Course Offerings

The program offers selected courses from this catalog as warranted by student needs and availability of faculty. Specific offerings for each term may be found in the Schedule of Classes.

ENV 308 Introduction to Environmental Studies (4)
Survey of a broad range of environmental issues from a scientific viewpoint. Basic ecological and thermodynamic principles with applications to air, water and land pollution; human demography and food supplies; alternative futures. *Satisfies the university general education requirement in the natural science and technology knowledge exploration area.*
Prerequisite: sophomore standing.

ENV 310 Economics of the Environment (3)
Identical with ECN 310.
Prerequisite: ECN 150 or 201 or 210.

ENV 312 Energy and the Environment (4)
Basic facts of energy: sources, forms, the roles it plays, and its ultimate fate. Includes study of laws limiting energy utilization, energy flow patterns, effects of energy use on the environment and analyses of current energy-related problems.
Prerequisite: sophomore standing; mathematics proficiency at the MTH 011 level.

ENV 322 The Food Quest (4)
Identical with AN 322.

ENV 350 Selected Topics (1, 2, 3 or 4)
Technical studies in special areas; topics vary with semester. May be repeated for credit.
Prerequisite: junior standing and permission of instructor.

ENV 354 Global Environmental Governance (4)
Identical with PS 354. *Satisfies the university general education requirement in the knowledge application integration area. Prerequisite for knowledge applications integration; completion of the general education requirement in the social science knowledge exploration area. Satisfies the university general education requirement for a writing intensive course in general education or the major, not both.*
Prerequisite for writing area: completion of the university writing foundation requirement.

ENV 355 Public and Environmental Health (3)
Emphasizing a public health perspective, this course surveys human health issues along with control strategies to reduce risk. Topics include: epidemiology, disease vectors, drinking water, occupational health, food protection, solid and hazardous wastes.
Prerequisite: sophomore standing.

ENV 364 Hazardous Materials Emergency Response (3)
Review of standard operating procedures when dealing with responses to hazardous materials incidents. Planning procedures, policies and application of procedures for incident levels, personal protective equipment, decontamination, safety, communications and governmental reporting are stressed.
Prerequisite: sophomore standing.

ENV 368 Fundamentals of Hazardous Materials Regulations (3)
An introduction to the regulations governing the manufacture, use, storage, transportation, treatment and disposal of hazardous materials. Related management issues of liability, compliance, ethics, assessment, remediation and clean-ups will be discussed.
Prerequisite: sophomore standing; ENV 386 recommended.

ENV 373 Water Resources (3)
Analysis of natural water systems, introductory hydrology, the chemistry of eutrophication, and wastewater systems. Emphasis is on applications, including water pollution abatement and management strategies.
Prerequisite: CHM 158 (or 168) and sophomore standing.

ENV 375 Introduction to Apiculture and Sustainability (4)
Beekeeping, bee biology, and bee biochemistry, general hive maintenance, and the use of apiculture in sustainable agricultural practices. Field work accompanies lecture.
Prerequisite: BIO 113 with a grade of 2.0 or greater.

ENV 386 Principles of Occupational Health (3)
Recognition, evaluation and control of chemical and physical stresses in the workplace that may adversely affect human health.
Prerequisite: sophomore standing; BIO 113, CHM 234; physics is desirable.

ENV 387 Industrial Hygiene Field Survey (3)
Selected subjects of current interest in occupational and environmental health and review of occupational health programs at local industrial companies through site visits.
Prerequisite: ENV 386 recommended.

ENV 388 Occupational Health Control Methods (3)
Theory and practice in the control of occupational health hazards, including personal protective equipment, noise, radiation, ventilation and engineering design.
Prerequisite: ENV 386 recommended.

ENV 389 African Environmental History (4)
Identical with HST 389.
Prerequisite: WRT 160.

ENV 390 Directed Studies (1, 2, 3, 4 or 6)
Studies in special areas, often individually arranged. May be repeated for credit. Preparation of study plan and instructor's approval are required before registration. Graded S/U.
Prerequisite: permission of instructor.

ENV 410 Human Adaptation (4)
Identical with AN 410.

ENV 446 Industrial and Environmental Toxicology (3)
Introduction to the basic concepts and techniques of toxicology, with special attention given to the industrial environment. Evaluation of the toxic effects of substances and toxic responses to various substances. Principles of toxicology applied to biological systems: exposure, biotransformations, mechanisms of toxicity, dose-response relationships and factors influencing toxicity. Identical with OSH 446. *Satisfies the university general education requirement for a writing intensive course in the major. Prerequisite for writing intensive: completion for the university writing foundation requirement.*
Prerequisite: an organic chemistry course.

ENV 452 Environmental Management Systems (3)
Problems of air and water pollution, solid waste management, hazardous material handling, life cycle analyses and pollution control examined from several viewpoints. Solutions to pollution problems, control technologies, practical aspects and compliance with regulations.
Prerequisite: sophomore standing, CHM 158 (or 168).

ENV 461 Environmental Law and Policies (3)
Legislative and legal perspectives on environmental and occupational health issues. Special emphasis on current laws and regulations, as well as their impact on the groups regulated.
Prerequisite: sophomore standing.

ENV 470 Environmental Science Internship (3)
Supervised practical experiences in an environmental health setting. Weekly journal and a written paper are required. *Satisfies the university general education requirement for the capstone experience. Satisfies the university general education requirement for a writing intensive course in the major. Prerequisite for writing intensive: completion of the university writing foundation requirement.*
Prerequisite: junior standing. Permission of instructor.

ENV 474 Industrial Hygiene Monitoring Methods (3)
Sampling and analysis of occupational health hazards and evaluation of the effectiveness of industrial hygiene control methods in laboratory and field locations.
Prerequisite: ENV 386 recommended.

ENV 485 Environmental Fate and Transport (3)
Distribution and transformation of chemical pollutants in air, water and soil. Topics include chemical equilibrium and mass transport processes, biotic and abiotic transformations, hydrology, and physiochemical properties of chemical pollutants that affect transport, accumulation and degradation.
Prerequisite: CHM 234.

ENV 486 Toxic Substance Control (3)
Quantification and management of toxic substances, including production, use, distribution, exposure and control. Risk assessment and regulatory strategies will be emphasized.
Prerequisite: BIO 111, 113; CHM 234.