

Entomology—ENT

- 812 Graduate Seminar**
Fall, Spring. 1(1-0) A student may earn a maximum of 10 credits in all enrollments for this course.
Current research topics. Student presentation required.
- 815 Insect Behavior**
Fall of odd years. 3(2-3) RB: (ENT 404)
Fundamentals of insect behavior with emphasis on mechanisms. Quantitative methods.
- 818 Systematics, Morphology, Biology: Adults**
Spring of even years. 3(1-7) RB: (ENT 404)
Classification, identification, morphology, biology and evolutionary relationships of adult insects. Specimens provided.
- 838 Systematics, Morphology, Biology: Immatures**
Fall of even years. 3(1-7) RB: (ENT 404)
Classification, identification, morphology, biology and evolutionary relationships of immature insects. Emphasis on terrestrial holometabola. Collection required.
- 844 Insect Ecology, Evolution and Conservation**
Fall of even years. 3(3-0) RB: (ENT 404)
Unique characteristics and principles of insect ecology and evolution including trophic relationships, community structure, speciation, coevolution and conservation.
- 848 Biological Control of Insects and Weeds**
Spring of odd years. 3(2-2) RB: Ecology and introductory entomology
Principles and practices in the application of natural enemies to control arthropod and weed pests. Identification and biology of beneficial species (parasitoids, predators, pathogens) and the ecological basis for their use in pest management systems.
- 850 Insect Physiology**
Spring of odd years. 3(2-2) RB: (ENT 404)
System by system description of insect form and function. Examples of how physiological systems are coordinated for complex biological functions.
- 851 Molecular Entomology**
Fall of odd years. 3(3-0) Interdepartmental with Genetics.
Analysis of molecular processes unique to insects, and their potentials for genetic engineering.
- 870 Nematode Management in Crop Systems**
Summer of even years. 3(2-3)
Interdepartmental with Plant Pathology. RB: (PLP 405) SA: BOT 870
Biology, host parasite relationships and management by farming and cropping systems of selected nematode diseases of economic plants.
- 890 Independent Study**
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Open only to graduate students.
Individual study on a field or laboratory research topic or review of published literature on a topic of interest.
- 898 Master's Research**
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 10 credits in all enrollments for this course. R: Open only to master's students in Entomology.
Master's degree Plan B research paper.

- 899 Master's Thesis Research**
Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 24 credits in all enrollments for this course. R: Open only to master's students in Entomology.
Master's thesis research.
- 940 Analytical Techniques for Bioactive Compounds: Separation**
Spring of odd years. 4(2-6)
Extraction and chromatographic separations of compounds from environmental matrices.
- 941 Analytical Techniques for Bioactive Compounds: Confirmation**
Spring of even years. 4(2-6)
Instrumental confirmation of compounds from environmental matrices.
- 999 Doctoral Dissertation Research**
Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to Ph.D. students in Entomology.
Doctoral dissertation research.

ENVIRONMENTAL ECONOMICS AND POLICY

E E P

Department of Agricultural Economics College of Agriculture and Natural Resources

- 201 Community Economics**
Fall. 3(3-0) SA: PRM 201
Policy analysis of state and local government revenues, services, and private business regulation. Impact on resource use, economic development, income distribution and human values.
- 211 Introduction to Gender and Environmental Issues**
Spring. 3(3-0) Interdepartmental with Fisheries and Wildlife; Forestry; Resource Development; Women's Studies.
Administered by Department of Fisheries and Wildlife. R: Not open to freshmen. SA: PRM 211
The concept of gender. Overview of environment and habitat. Historical gender roles in environmental management. Gender-based theoretical perspectives. Case studies on developing and developed countries. Environmental management with emphasis on fisheries, wildlife and wetlands. Women environmental professionals.
- 255 Ecological Economics**
Fall, Spring. 3(3-0) RB: (EC 201) SA: PRM 255
Relationship between the economy and the natural environment. Economic organization and sustainability. Economic concepts applied to natural resources and agriculture.
- 260 World Food, Population and Poverty**
Fall. 3(3-0) SA: PRM 260
Description and analysis of world food, population and poverty problems. Interrelationships between developed and developing countries.

- 320 Environmental Economics**
Spring. 3(3-0) P:M: (EEP 255) SA: PRM 320
Analytical methods for evaluating economic impacts of environmental policies and understanding the economic causes of environmental problems.
- 335 Taxes, Government Spending and Public Policy**
Fall, Spring, Summer. 3(3-0)
Interdepartmental with Economics. Administered by Department of Economics. P:M: (EC 201 or EC 251H) SA: PRM 335
Not open to students with credit in EC 435 or EC 436.
Economics of the public sector. Public goods, externalities, design and incidence of the tax system. Equity and efficiency effects of government programs.
- 404 Public Sector Budgeting and Program Evaluation (W)**
Spring. 3(3-0) P:M: Completion of Tier I writing requirement. RB: (EC 201 or EC 202) and (STT 200 or STT 201 or STT 315) R: Not open to freshmen or sophomores. SA: PRM 404
Structure and finance of government. Approaches to public sector budgeting. Evaluation of output of programs and community services. Impact and multiple outcome analysis.
- 405 Corporate Environmental Management**
Fall. 3(3-0) Interdepartmental with Agribusiness Management. P:M: (EEP 255 or ABM 332 or MGT 315 or MGT 325) SA: PRM 405
Integration of environmental protection and pollution prevention with business management. Economic and strategic analysis of environmental protection.
- 430 Law and Resources**
Fall. 3(3-0) Interdepartmental with Resource Development; Forestry. Administered by Department of Resource Development. RB: (RD 301) R: Open only to juniors or seniors or graduate students. SA: PRM 430
Legal principles applied to natural resource use. Sovereignty, property rights, land and water use, jurisdiction, public trust doctrine, fish and game law, mineral rights, and eminent domain. Case and statutory law analysis.
- 433 Law and Social Change**
Spring. 3(3-0) Interdepartmental with Resource Development; Sociology. Administered by Department of Resource Development. RB: (RD 301 or RD 336 or GBL 395) R: Open only to juniors or seniors. SA: PRM 433
Function of law in a modern society. Concepts of power, public regulation, civil rights, and property rights. Limits on freedom.
- 440 The Resource Development Policy Process in Michigan**
Spring. 3(3-0) Interdepartmental with Resource Development. Administered by Department of Resource Development. RB: (RD 200 or EEP 201 or PLS 100 or PLS 301 or PLS 324) SA: PRM 440
Public policy formation related to environmental and economic development issues at state and community levels. Observation and analysis of actual proceedings. Field trips required.

453 Women and Work: Issues and Policy Analysis
Spring. 3(3-0) Interdepartmental with Economics; Women's Studies. RB: (EC 201 or EC 202 or EEP 201 or concurrently) R: Not open to freshmen or sophomores.

Current and past quantity and quality of women's participation in the labor force. Gender differentials in earnings and occupations. Employment discrimination. Laws, especially affirmative action laws. Social policy effects. International issues.

470 Theory and Practice in Community and Economic Development
Fall. 3(3-0) Interdepartmental with Resource Development; Sociology. Administered by Department of Resource Development. P:M: (EC 201 or EC 202) SA: PRM 470

Concepts, principles, models, and skills for community and economic development. Community participation in local development initiatives.

490 Independent and Supervised Study
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 7 credits in all enrollments for this course. P:M: (EEP 201 or EEP 255) R: Open only to Environmental Economics and Policy majors. Approval of department; application required. SA: PRM 490

In-depth independent study of topics affecting public resource management. Complementary with previous coursework, adapted to career aspirations.

493 Professional Internship in Public Resource Management
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. RB: (EEP 201) R: Open only to juniors or seniors in the Environmental Economics and Policy major. Approval of department; application required. A student may earn a maximum of 6 credits in all enrollments for any or all of these courses: ABM 493, AEE 493, ANR 493, ANS 493, CSS 493, EEP 493, FIM 493, FW 493, HRT 493, PKG 493, PLP 493, PRR 493, and RD 493. SA: PRM 493

Supervised professional experience in agencies and businesses related to public resource management.

ENVIRONMENTAL ENGINEERING ENE

Department of Civil and Environmental Engineering College of Engineering

427 Environmental Toxicology and Society
Spring of odd years. 3(3-0) Interdepartmental with Animal Science; Sociology. Administered by Department of Animal Science. RB: (ISB 200 or ISB 202 or ISB 204 or ISB 206H or BMB 200 or BS 111 or BS 110)

Impact of environmental chemicals on health and modern society. Cellular and organ functions and their interface with the environment. Limitations of scientific investigation and environmental regulations.

800 Environmental Engineering Seminar
Fall, Spring. 1(1-0) R: Open only to Environmental Engineering majors.
Current research in environmental engineering.

801 Dynamics of Environmental Systems
Spring. 3(3-0)
Principles of mass balance, reaction kinetics, mass transfer, reactor theory in environmental engineering.

802 Physicochemical Processes in Environmental Engineering
Fall. 3(3-0) RB: (ENE 801)
Physical and chemical principles of air and water pollution control and environmental contaminants in water, air and soils.

804 Biological Processes in Environmental Engineering
Fall. 3(3-0) RB: (ENE 801 or concurrently)
Engineering of microbial processes used in wastewater treatment, in-situ bioreclamation, and solid waste stabilization.

806 Laboratory Feasibility Studies for Environmental Remediation
Spring. 3(2-4) RB: (ENE 802 and ENE 804) R: Open only to graduate students in Environmental Engineering, Environmental Engineering-Environmental Toxicology, and Environmental Engineering Urban Studies. Not open to students with credit in ENE 803 or ENE 805.

Analysis and characterization of contaminants in soil or water. Conceptual and preliminary design of treatment systems. Use of treatability studies to evaluate treatment options. Oral presentations and preparation of consulting reports with design recommendations.

807 Environmental Analytical Chemistry
Fall. 3(3-0) R: Open only to Environmental Engineering majors.
Techniques for measurement and analysis in environmental engineering. Sample preparation. Quality assurance.

808 Environmental Analytical Chemistry Laboratory
Spring. 1(0-3) RB: (ENE 807) R: Open only to Environmental Engineering majors.
Laboratory work in environmental analytical chemistry.

880 Independent Study in Environmental Engineering
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to Environmental Engineering majors.
Solution of environmental engineering problems not related to student's thesis.

890 Selected Topics in Environmental Engineering
Fall, Spring, Summer. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. R: Open only to Environmental Engineering majors.
Selected topics in new or developing areas of environmental engineering.

892 Master's Research Project
Fall, Spring, Summer. 1 to 5 credits. A student may earn a maximum of 5 credits in all enrollments for this course. R: Open only to master's students in the Environmental Engineering major. Approval of department.
Master's degree Plan B individual student research project. Original research, research replication, or survey and reporting on a research topic.

893 Master's Design Project
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course. R: Open only to master's students in the Environmental Engineering major. Approval of department.
Master's degree Plan B individual student environmental engineering design project.

899 Master's Thesis Research
Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 24 credits in all enrollments for this course.
Master's thesis research.

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 72 credits in all enrollments for this course.
Doctoral dissertation research.

EPIDEMIOLOGY EPI

Department of Epidemiology College of Human Medicine

390 Disease in Society: An Introduction to Epidemiology and Public Health
Spring. 3(3-0) Interdepartmental with Social Science.

Human epidemiology and population health issues facing contemporary society, in both developed and less developed settings. Health-related information in the mass media and scholarly publications.

805 Readings in the Historical Roots of Epidemiological Thought
Fall. 3(3-0) Interdepartmental with History.
Historical evolution of models of disease causation and population perspectives on disease.

806 Workshop in History of Public Health
Spring. 3(3-0) Interdepartmental with History.
Historical reasoning, research and writing on a significant event or theme in history of epidemiology and public health.

810 Introduction to Descriptive and Analytical Epidemiology
Fall. 3(3-0) R: Open only to master's students in the Epidemiology major or approval of department. SA: HM 810
Study of disease from a population perspective as the interaction of host, agent, and environment. Fundamental concepts include case definition, measuring frequency of disease, mortality and morbidity data, and major study designs.