

999 Doctoral Dissertation Research
 Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to doctoral students in the English major.
 Doctoral dissertation research.

ENGLISH AS A SECOND LANGUAGE ESL

Department of Linguistics and Germanic, Slavic, Asian and African Languages College of Arts and Letters

090A Intensive English for Non-Native Speakers
 Fall, Spring. 0(20-0) R: Approval of English Language Center. SA: ENG 090A
 Explanation and intensive practice of English skills. Focus on beginning grammar, speaking, listening, reading, and writing.

090B Intensive English for Non-Native Speakers
 Fall, Spring. 0(20-0) R: Approval of English Language Center. SA: ENG 090B
 Explanation and intensive practice of English skills. Focus on intermediate grammar, speaking, listening, reading, and writing.

090C Intensive English for Non-Native Speakers
 Fall, Spring. 0(20-0) R: Approval of English Language Center. SA: ENG 090C
 Explanation and intensive practice of English skills. Focus on advanced grammar, speaking, listening, reading, and writing.

ENTOMOLOGY ENT

Department of Entomology College of Agriculture and Natural Resources College of Natural Science

110 Applied Entomology for Ornamentals and Turf
 Fall of odd years. 3(2-2) RB: Interest or experience in ornamentals and turf production systems. R: Open only to students in the Institute of Agricultural Technology. Not open to students with credit in ENT 111.
 Arthropod pests of woody ornamentals and turf grasses. Groups and species of importance to northern Michigan.

111 Basics of Applied Entomology
 Spring. 2(2-1) R: Open only to students in the Institute of Agricultural Technology. SA: AT 057 Not open to students with credit in ENT 110 or AT 057.
 Basic insect biology, principles of integrated pest management, and the major pests of field crops, woody ornamentals, other perennials, turf, and commercial greenhouses. Offered first ten weeks of semester.

205 Pests, Society and Environment
 Fall, Spring. 3(3-0) Interdepartmental with Plant Pathology.
 Nature of pests and their impact on society. Principles of integrated pest management in relation to environmental quality and sustainable development.

222 New Horizons in Biotechnology
 Fall. 2(2-0) Interdepartmental with Crop and Soil Sciences. Administered by Department of Crop and Soil Sciences.
 Perspectives on biotechnology for safer food production, environmental quality, and improved human health. Impacts of biotechnology on the national economy. Political and ethical ramifications of applied biotechnology.

319 Introduction to Earth System Science
 Fall. 3(3-0) Interdepartmental with Plant Biology; Geological Sciences; Zoology; Sociology. RB: Completion of one course in biological or physical science.
 Systems approach to Earth as an integration of geochemical, geophysical, biological and social components. Global dynamics at a variety of spatio-temporal scales. Sustainability of the Earth system.

362 Management of Turfgrass Pests
 Fall. 4(3-2) Interdepartmental with Crop and Soil Sciences; Plant Pathology. Administered by Department of Crop and Soil Sciences. P:M: (CSS 232)
 Chemical, biological, and cultural methods of managing weeds, diseases, and insect pests of turfgrass. Environmental considerations in pest management.

401 Directed Studies
 Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 8 credits in all enrollments for this course. R: Approval of department.
 Individual field or laboratory research, or review of published literature, on a topic of interest.

404 Insects: Success in Biodiversity
 Fall. 4(3-4) P:M: (BS 110) or (BOT 105 and BOT 106)
 Biological adaptations of insects to the environment. Evolution, behavior, ecology, metamorphosis, classification, importance to humans, and pest management.

407 Diseases and Insects of Forest and Shade Trees
 Spring. 4(3-3) Interdepartmental with Plant Pathology; Plant Biology. Administered by Department of Plant Pathology. P:M: (PLB 105 or BS 110 or LBS 144 or LBS 148H) and (PLB 218 or FOR 204 or HRT 211) and completion of Tier I writing requirement. SA: BOT 407
 Diseases, insects, and environmental problems affecting trees in forests, parks, suburbs, and nurseries. Methods of control.

410 Apiculture and Pollination
 Fall. 2(1-2)
 Biology of bees and their relationship to flowers, pollination and crop production.

419 Advanced Earth System Science
 Spring. 3(2-2) Interdepartmental with Plant Biology; Geological Sciences; Zoology; Sociology. P:M: (ENT 319)
 Systems science theory applied to analysis of the biological, geological, physical, and social causes and consequences of global changes. Issues of sustaining the Earth system.

422 Aquatic Entomology
 Fall of odd years. 3(2-3) Interdepartmental with Fisheries and Wildlife; Zoology. P:M: (BS 110) SA: ENT 420
 Biology, ecology and systematics of aquatic insects in streams, rivers and lakes. Field trips and aquatic insect collection required.

442 Concepts of Biological Information Systems
 Spring. 3(3-0) Interdepartmental with Resource Development. R: Open only to seniors or graduate students.
 Systems approach to managing biological information using computer technology.

460 Medical and Veterinary Entomology
 Spring of even years. 3(2-3) P:M: (BS 110) R: Not open to freshmen or sophomores.
 Insects and other organisms related to human and animal health. Ectoparasites, ecology of vector-borne diseases, epidemiology, and management of arthropod vectors.

469 Biomonitoring of Streams and Rivers
 Summer of even years. 3(2-3) Given only at W.K. Kellogg Biological Station. Interdepartmental with Fisheries and Wildlife. P:M: (BS 110)
 Practical field and lab rapid bioassessment methodologies used to sample and assess the biota of streams and rivers. Sampling and identification of fish, macroinvertebrates and other biota will be emphasized.

470 General Nematology (W)
 Spring of odd years. 3(2-3) P:M: (BS 110) or (BS 111 and BS 111L) and completion of Tier I writing requirement.
 Biology of nematodes with special reference to the influence of phytoparasitic, entomopathogenic, animal parasitic, microbiotrophic and marine species on human ecology.

477 Pest Management I: Pesticides in Management Systems
 Fall. 3(3-0) Interdepartmental with Crop and Soil Sciences; Fisheries and Wildlife; Horticulture. RB: (CEM 143 or CEM 251) and (BOT 405 and CSS 402) and (ENT 404 or ENT 470 or FW 328)
 Chemistry, efficient use, and environmental fate of pesticides. Legal and social aspects of pesticide use.

478 Pest Management II: Biological Components of Management Systems (W)
 Spring of even years. 3(2-3) Interdepartmental with Crop and Soil Sciences; Forestry; Fisheries and Wildlife; Horticulture. P:M: (ENT 404 or ENT 470 or PLP 405 or CSS 402 or FW 328) and completion of Tier I writing requirement.
 Principles of host plant resistance and biological control and their relationship to the design of agroecosystems. Classification of insect biological control agents.

485 Tropical Biology
 Spring. 3(3-0) Interdepartmental with Zoology; Plant Biology. Administered by Department of Zoology. P:M: (ZOL 355) R: Open only to juniors or seniors.
 Tropical biota emphasizing evolutionary and ecological principles compared across tropical ecosystems.

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.