

## Descriptions — English

### of Courses

986. **Seminar: American Literature and Culture**  
Fall, Winter, Spring. 3(3-0) May reenroll for a maximum of 12 credits.

American literature in a cultural context, drawing upon popular and fine arts, the history of ideas, the history of social movements.

998. **Advanced Writing for Doctoral Candidates**

Fall. 3(3-0) May reenroll for a maximum of 12 credits. Admission to a doctoral program or approval of instructor.

Training for writing dissertations and publishing in the sciences, humanities, and other fields. Includes a detailed analysis of each student's style, methods of organizing, practice in editing, and individual conferences.

999. **Doctoral Dissertation Research**

Fall, Winter, Spring, Summer. Variable credit. Approval of department.

## ENTOMOLOGY

## ENT

### College of Agriculture and Natural Resources College of Natural Science

201. **Insects and Society (N)**

Fall. 4(4-0)

Influence of insects on the human race from a global and historical perspective. Environmental and cultural factors and how they influence and interrelate with the insects.

250. **Pests, Environmental Quality and Ecosystem Management (N)**

Winter. 3(4-0)

Impact of pests and pesticides in ecosystems and society, with emphasis on integrated pest management and environmental quality.

301. **General Entomology**

Fall, Spring, Summer of even-numbered years. Given at W. K. Kellogg Biological Station Summer of even-numbered years. Fall, Spring: 3(3-0) Summer of even-numbered years: 3 credits. B S 212 recommended.

Biological relationships of insects. Insect behavior, ecology, and classification. Metamorphosis and development of insects.

302. **General Entomology Laboratory**

Fall, Spring, Summer of even-numbered years. Given at W. K. Kellogg Biological Station Summer of even-numbered years. Fall, Spring: 2(0-6) Summer of even-numbered years: 2 credits. B S 212 recommended.

Insect diversity with emphasis on morphology, development, classification, identification, bionomics, and evolution. Stresses reproductive strategies and general adaptability as relates to the overall ecological success of insects.

330. **Forest Protection**

Fall. 4(4-0) FOR 304, FOR 305, FOR 320. Interdepartmental with the departments of Botany and Plant Pathology and Forestry. Administered by the Department of Forestry.

Procedures used to detect and respond to pest, fire and environmental problems in a variety of forest types.

337. **Forest and Shade Tree Entomology**

Fall. 4(3-2) Three terms of natural science.

Ecological relationships of insect/tree interactions. Taxonomy of insects and recognition of insect injury. Biological, chemical, silvicultural and integrated control methods. Insect collection required (see instructor during prior spring term).

401. **Problems**

Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 12 credits. Approval of department.

Advanced individual work on a field or laboratory research problem or a study of published literature on a selected topic.

410. **Apiculture and Pollination**

Spring. 3(2-2)

Biology of the honey bee and some of the wild bees. Relationships between bees and flowering plants. Value of bees in crop pollination. Introduction to management with visits to the University apiary.

415. **Insect Behavior**

Winter of even-numbered years. 3(3-0) ENT 301, ENT 302; ZOL 313 recommended.

Mechanisms and adaptive significance of communication, orientation, food and habitat selection and behavioral rhythmicity in insects.

418. **Systematic Entomology**

Winter. 4(1-9) ENT 301, ENT 302.

General taxonomic course to acquaint the student with the various groups of insects.

420. **Aquatic Insects**

Spring. 4(3-3) ENT 301, ENT 302.

Biology, ecology and systematics of aquatic insects. Insect collection required.

425. **Agricultural Entomology**

Winter. 4(3-2) One year of biological or agricultural sciences.

Natural processes of insect populations and associated techniques that are important to agriculture.

438. **Taxonomy of Immature Insects**

Spring of even-numbered years. 4(1-9) ENT 418.

Identification of immature insects with particular emphasis on the Holometabola.

440. **External Morphology of Insects**

Fall. 4(2-6) ENT 301, ENT 302, or approval of department.

Morphological concepts of external skeletal parts of insects. Emphasis on evolutionary development of structures from the Apterygota through the Pterygota.

444. **Insect Ecology**

Fall of odd-numbered years. 3(3-0) One course in introductory entomology.

Unique characteristics and principles of insect ecology. Trophic relationships, populations, climate, co-existence, competition, behavior, communities and distributions.

450. **Insect Physiology**

Fall of even-numbered years. 5(3-4) ENT 301, ENT 302; 1 biochemistry or physiology course; 1 year of chemistry including 1 term of organic.

General and comparative physiology of insects, treating molecular, tissue and organ function. Laboratory exercises emphasizing mastery of sound experimental procedures.

455. **Toxicology of Insecticides**

Winter of odd-numbered years. 4(4-0) 1 term organic chemistry.

Properties of insecticides. Mode of action, metabolism and movement in animals. Safety and potential hazards to humans and wildlife. Fates of insecticides in the environment.

460. **Medical Entomology**

Spring. 4(3-3) ENT 301, ENT 302, or approval of department.

Distribution and biology of important arthropod vectors of diseases to humans, disease symptoms, life cycle of the infectious agent, reservoirs, urticating arthropods, anaphylactic reactions, myiasis, and prophylactic measures.

470. **Nematode Diseases of Economic Plants**

Spring of odd-numbered years. 4(3-3) BOT 405. Interdepartmental with the Department of Botany and Plant Pathology.

Major nematode diseases of economically important plants, with emphasis on diagnostic symptoms, nematode biology and principles of control.

478. **Stream Ecology**

Fall. 3(3-0) ENT 420, ZOL 389 or BOT 450 or F W 302 or approval of department. Interdepartmental with the departments of Fisheries and Wildlife, and Zoology. Administered by the Department of Fisheries and Wildlife.

Biological, chemical, physical, and geological processes which determine the structure and function of stream ecosystems.

812. **Graduate Seminar Topics**

Fall, Winter, Spring, Summer. 1(1-0) May reenroll for a maximum of 8 credits if different topics are taken. Graduate students and approval of department.

Graduate level seminars on current research and philosophy. Student participation required.

815. **Biological Control**

Spring of even-numbered years. 3(2-3) Approval of department.

Properties of entomophagous species; relationships to population ecology and systematics; foreign exploration, colonization, manipulation, and evaluation; interactions with pesticides, analysis of successful programs, and future trends. Collection for taxonomic lab to be made the summer before.

820. **Applied Insect Ecology**

Fall of odd-numbered years. 3(2-3) Approval of department.

Ecological factors in an insect's ecosystem that can be manipulated for the purpose of pest management. Critical evaluation of current and classical literature presented by students in both oral and written reports.

851. **Molecular Entomology**

Fall of odd-numbered years. 5(3-4) Approval of department.

Analysis of molecular processes unique to insects, and their potentials for genetic engineering. Laboratory on cell and molecular biological techniques.

871. **Biology of Nematodes**

Spring of even-numbered years. 4(2-6) ENT 470 or approval of department. Interdepartmental with the Department of Botany and Plant Pathology.

Ontogeny, taxonomy, morphology, pathology and ecology of nematodes, with special reference to plant-parasitic and phytopathogenic species.

**881. Biology of the Arthropoda**  
*Winter. 5(3-6) ZOL 306 or approval of department. Interdepartmental with and administered by the Department of Zoology.*  
 Ecology, life cycles, morphology, taxonomy, and distribution of arthropoda other than insects.

**890. Problems**  
*Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 12 credits. Majors or approval of department.*  
 Advanced individual work in: apiculture, aquatic insects, insect biochemistry, biosystematics, economic insects, insect ecology, forest insects, morphology, nematology, insect physiology, plant disease transmission, insect toxicology, araneida, acarina, medical entomology, chemistry of insecticides, insect biology, extension entomology, systems.

**899. Master's Thesis Research**  
*Fall, Winter, Spring, Summer. Variable credit. Approval of department.*

**940. Analytical Techniques for Biological Compounds I**  
*Winter of odd-numbered years. 4(2-6) Organic chemistry, approval of department.*  
 Application, extraction, cleanup and purification techniques employed in analysis of biologically active compounds. Stresses use of radioisotopes, and column, paper, thin-layer, and molecular sieve chromatography.

**941. Analytical Techniques for Biological Compounds II**  
*Winter of even-numbered years. 4(2-6) ENT 940.*  
 Analytical techniques used for identification and quantification of biologically active compounds. Emphasis on spectroscopy and gas-liquid chromatography.

**999. Doctoral Dissertation Research**  
*Fall, Winter, Spring, Summer. Variable credit. Approval of department.*

**ENVIRONMENTAL  
ENGINEERING**

See Civil and Environmental Engineering.

**FAMILY AND CHILD  
ECOLOGY FCE**

**College of Human Ecology**

**118. Family Resources**  
*Fall. 3(2-2)*  
 Skill development in identification, description and classification of human and non-human family resources on a historical and cross-cultural basis.

**145. The Individual, Marriage and the Family**  
*Fall, Winter, Spring. 4(4-0) Students may not receive credit in both FCE 145 and S W 228.*  
 Individual as young adult. Alternative living patterns. Marriage as social institution. Courtship and marriage patterns. Adjustments in marriage. Attitudes and roles in family living. Crises situations. Family planning.

**200. Ecological Approach to Family and Health**  
*Fall, Winter. 2(2-0) Sophomores. Not open to HEC majors.*  
 Use of the human ecosystem perspective to study people and their various environments with focus on family and health support systems.

**221. Human Services in the Community**  
*Fall, Spring. 4(3-3)*  
 Analysis of human and community needs: roles of professionals and volunteers in providing community and human services. Participation in community agency required.

**238. Personal Finance**  
*Fall, Winter, Spring. 3(3-0)*  
 Strategies, techniques and resources useful in the management of personal finance.

**255. Family and Individual Development: Life Cycle**  
*Winter, Spring. 3(3-0) Three terms of natural science; sophomores.*  
 Overview of family development. Predictable individual developmental changes over the life span. Cognitive, moral, physical, psychological and social aspects. Interface between individual and family development.

**262A. Child Growth and Development: Conception through Early Childhood**  
*Fall, Winter, Spring, Summer of odd-numbered years. 3(3-0) Sophomores, FCE 262B concurrently; one of the following: PSY 160, PSY 170, T E 200, T E 200A, T E 200B, T E 200C, T E 200D.*  
 Physical, cognitive, social, and emotional aspects of human growth and development from conception through early childhood.

**262B. Child Growth and Development Laboratory**  
*Fall, Winter, Spring, Summer of odd-numbered years. 1(0-3) FCE 262A or concurrently, approval of department.*  
 Observation of human development in infants and young children.

**263. Children, Youth and the Family**  
*Fall, Winter. 3(3-0) Sophomores; SOC 241 or FCE 145 or FCE 262A; or approval of instructor.*  
 A family systems perspective of middle childhood, adolescence, and youth development is presented, incorporating childhood through launching stages of family development. Interactions of parents, children and socio-cultural factors are analyzed.

**331. Management and Decision Making in the Family**  
*Fall, Winter. 3(3-0) HEC 201, Juniors.*  
 Integrated nature of management in the family setting from an ecosystem perspective. Values and goals as reflected in decision making about family resources.

**332. Application of Principles of Home Management**  
*Fall, Spring. 2(0-5) FCE 331.*  
 Principles of effective home management and their application in a living situation.

**337. Energy Utilization in the Household**  
*Fall, Summer of even-numbered years. 3(3-0) FCE 331 or approval of department.*  
 Human and fossil fuel energy use at the household level. Issues and policies regarding work accomplishment in the home.

**340. Instruction in Human Ecology for Non-Formal Settings**  
*Fall, Winter. 3(2-2) Juniors, FCE 221 or approval of department.*  
 Theory and practice of instruction in Human Ecology with specific application to non-formal environments.

**364A. Interacting with Young Children in Child Development Centers**  
*Fall, Winter. 3(3-0) FCE 262A, FCE 262B each with minimum grade of 2.0; FCE 364B concurrently.*  
 Application of principles of human growth and development to personal interaction with children ages three to six individually and in small groups in schools of early childhood.

**364B. Interacting with Young Children—Laboratory**  
*Fall, Winter. 1(0-3) FCE 364A or concurrently, FCE 262B each with a minimum grade of 2.0, approval of department.*  
 Experience in interaction with children ages two to six years, individually and in groups in a child development center.

**369A. Learning Activities for Early Childhood Programs**  
*Winter, Spring. 3(3-0) FCE 364A, FCE 364B each with a minimum grade of 2.0; FCE 369B concurrently.*  
 Planning learning activities and teaching strategies for children ages 3 to 6 in early childhood education programs.

**369B. Learning Activities for Early Childhood Programs—Laboratory**  
*Winter, Spring. 1(0-3) FCE 369A concurrently and approval of department.*  
 Experience in planning and carrying out learning activities with young children in an early childhood program.

**404. Home as a Learning Center**  
*Fall. 3(3-0) Seniors or approval of department.*  
 Learning processes and resource use in home settings. Exploration of linkages between the informal educational system and formal and non-formal systems.

**405. Work and the Family**  
*Winter. 3(3-0) Juniors.*  
 Examines the kinds and interrelationship of decisions made by the family and the paid work force (business/labor) as they relate to interaction between the family and the paid work sphere.

**436. Consumer Economic Problems**  
*Fall. 3(3-0) EC 201 or EC 202.*  
 Nature of current consumer problems. Sources of information and methods of evaluating information in the search for solutions to problems and for improved consumer protection.

**438. Family Financial Management**  
*Fall, Spring. 3(3-0) FCE 238, EC 202.*  
 Application of financial planning and budgeting strategies to families during various stages of the family life cycle. Current income support programs. Implications for the community of the family's financial decisions.