

ENTO - ENTOMOLOGY

ENTO 601 Principles of Systematic Entomology

Credits 3. 3 Lecture Hours. An introduction to the principles and theory of systematic zoology and comparative biology including species concepts and speciation; methods for higher classification including phylogenetic systematics, phenetics and evolutionary taxonomy; introduction to zoological nomenclature. **Prerequisite:** Graduate classification in entomology or other biological sciences.

ENTO 602 Insect Biodiversity and Biology

Credits 4. 3 Lecture Hours. 3 Lab Hours. Biodiversity and biology of the orders and selected families of insects; order-level morphology, family-level natural history and identification; field trips and an insect collection provide experience with insect collecting methods, specimen preparation techniques and field biology. **Prerequisite:** 6 hours of biological sciences.

ENTO 606 Quantitative Phylogenetics

Credits 4. 3 Lecture Hours. 4 Lab Hours. Designed to provide the theory and tools required for inference of phylogenetic (evolutionary) relationships among biological taxa using various types of comparative data including morphological characters, biochemical and molecular characters, and DNA sequences; hands-on analysis of data using contemporary tools. **Prerequisite:** ENTO 601 or approval of instructor. **Cross Listing:** GENE 606 and ECCB 606.

ENTO 608 Principles of Biological Control

Credits 3. 3 Lecture Hours. Theory and practices relating to the role and use of natural enemies in arthropod and plant population regulation; review and analysis of projects in biological control; biology and behavior of entomophagous arthropods. **Prerequisite:** ENTO 201 or equivalent or approval of instructor.

ENTO 610 Host Plant Resistance

Credits 3. 3 Lecture Hours. Host plant resistance programs from the standpoint of the plant breeder, plant pathologist and entomologist; team taught with each discipline represented; roundtable discussion of assigned readings and lectures. **Prerequisite:** Approval of instructor. **Cross Listing:** SCSC 610 and PLPA 610.

ENTO 612 Insect Evolution

Credits 3. 3 Lecture Hours. Review current and historical ideas about the phylogeny and evolution of the major groups of hexapods; includes evidential basis for hypotheses of monophyly, competing phylogenetic hypotheses, major innovations and trends affecting the adaptive radiations of specific taxa, morphological character systems, and history of insect classification and the major character systems. **Prerequisite:** One semester of insect or invertebrate zoology.

ENTO 614 Insect Community Ecology

Credits 3. 3 Lecture Hours. Provide a strong and contemporary foundation in insect population, community and evolutionary ecology; review historical and theoretical perspectives, current philosophies, approaches and a description of classic experiments used to test and modify theories on topics including insect herbivore-plant interactions; major biological forces affecting population dynamics and community structure (resource availability, competition, predation, mutualisms, etc.). **Prerequisite:** Graduate classification.

ENTO 615 Insect Physiology

Credits 3. 3 Lecture Hours. Physiological processes of insects; metabolism, nutrition, neuro-endocrinology, nerve action, cell structure, respiration, circulation, excretion and flight; functional integration and regulatory processes of total organism. **Prerequisite:** ENTO 306 or equivalent.

ENTO 616 Chemical Ecology

Credits 3. 2 Lecture Hours. 2 Lab Hours. Organisms emit, perceive, respond to chemical compounds; compounds play important roles in locating food, attract mates, associate with symbionts, deter enemies, and defend against pathogens; chemically mediated interactions among plants, animals, and microbes; functional and evolutionary basis for chemical signals and cues that elicit behavioral responses in organisms; analyzing compounds and behaviors; applications of chemical ecology for controlling pests or preventing disease. **Prerequisites:** Graduate classification.

ENTO 617 Acarology

Credits 4. 3 Lecture Hours. 3 Lab Hours. Systematics, morphology, physiology, and ecology of ticks and mites; management of acarine pests of humans, animals and plants; role of parasitic species in causation and transmission of diseases. **Prerequisite:** ENTO 208 or equivalent. (Offered in 2010-2011 and alternate years thereafter.)

ENTO 618 Medical and Veterinary Entomology

Credits 3. 2 Lecture Hours. 3 Lab Hours. Taxonomy, biology and epidemiological role of insects and other arthropods that directly and/or indirectly affect the health and well-being of humans and animals. **Prerequisite:** Graduate classification or approval of instructor.

ENTO 619 Insect Toxicology

Credits 3. 3 Lecture Hours. Classification and properties of major types of insecticides; chemistry, metabolism and mode of action; selectivity, use hazards, residues and resistance; environmental problems: biological magnification, persistence and effects on non-target organisms. **Prerequisites:** One course in organic chemistry and ENTO 615 or approval of instructor.

ENTO 625/GEOG 625 Landscape Ecology

Credits 3. 2 Lecture Hours. 3 Lab Hours. Study of structure, function and change in a heterogeneous land area composed of interacting ecosystems; examine basic ecological principles dealing with landscape structure. **Prerequisite:** Approval of instructor. **Cross Listing:** GEOG 625/ ENTO 625.

ENTO 626/VIBS 626 Methods in Vector-Borne Disease Ecology

Credits 3. 1 Lecture Hour. 5 Lab Hours. Methodological understanding of how vector-borne disease are studied in the field and the laboratory; hands-on exploration of the ecology of disease systems in a one health framework; concepts of design, execution, and presentation of research projects; outdoor field work and bio-safety level 2 laboratory. **Cross Listing:** VIBS 626/ ENTO 626.

ENTO 627 Insect Behavior and Natural History

Credits 3. 2 Lecture Hours. 3 Lab Hours. Broadly introduce the study of insect behavior with particular emphasis on hands-on activities in documenting the natural history of insects via field observations as well as conducting behavioral experiments using live insects; exposure to various types of insect behaviors such as feeding, defense, communication, and mating; learn how scientists have investigated these behaviors by discussing current and classic literature; learn theoretical and practical approaches involved in behavioral research in preparation to design and carry out individual research. **Prerequisites:** One semester of introductory entomology or equivalent, or approval of instructor; graduate classification.

ENTO 628 Arthropod Genomes and Gene Expression

Credits 3. 3 Lecture Hours. Introduction to the vocabulary and experimental procedures routinely used for molecular genetic studies using arthropod systems as model examples; discussion of germ-line transformation, transient gene expression, and the analysis of tissue-specific and genome-wide gene expression. **Prerequisite:** GENE 301 or equivalent.

ENTO 630 Insect Interactions with Microbes and Plant Hosts

Credits 3. 3 Lecture Hours. Concepts on phytophagous piercing/sucking insects, their complex interactions with their host plants and associated microbes, including transmission of plant pathogens. **Prerequisites:** Graduate classification or approval of instructor.

ENTO 631 Principles of Integrated Pest Management

Credits 3. 2 Lecture Hours. 3 Lab Hours. IPM history, conceptual foundations and basic principles; human practices aimed to reduce human carbon and chemical footprints on our planet; a series of pest control efforts towards a more sustainable agriculture. **Prerequisite:** Graduate classification or approval of instructor.

ENTO 632 Professional Grant and Contract Writing in Entomology

Credits 3. 3 Lecture Hours. Scientific and academic professional development; art of CV and grant writing; process of peer review evaluations of work. **Prerequisite:** Graduate classification or approval of instructor.

ENTO 633 Professional and Scientific Writing

Credits 3. 3 Lecture Hours. Professional writing, peer review; curriculum vitae, grant, contract writing, scientific writing, public communication; peer review evaluations, weekly writing. **Prerequisites:** Graduate classification.

ENTO 635 Vector-Borne Disease Management and Response In Human and Animal Systems

Credits 3. 3 Lecture Hours. Integration of arthropod vector biology and surveillance with response and management of vector-borne disease outbreaks; complex interactions of diverse authorities in vector-borne disease management and response; participation in designing, operating and assessing outbreak response and management plans; capstone experience in the Vector Biology and Vector-Borne Disease Response certificate. **Prerequisite:** ENTO 618.

ENTO 641 Engineering Vector Populations

Credits 3. 3 Lecture Hours. Genetic strategies developed and deployed to control vector-borne diseases; vector population replacement, reduction or elimination; CRISPR and Cas9, gene drive and sterile insect technique; social, regulatory, political and ecological factors concerning genetic technologies.

ENTO 642 Mosquito - A History of Humankind's Struggle for Survival with the Deadliest Animal on the Planet

Credits 3. 3 Lecture Hours. Mosquito-borne pathogens, human diseases; transmission cycles alternating replication susceptible vertebrate host, blood-feeding vector mosquito; biology of mosquitoes, historical approaches controlling mosquito-borne diseases, elimination of vectors; new approaches to disease control. **Prerequisites:** Graduate classification.

ENTO 646 Invertebrate Immunology

Credits 3. 3 Lecture Hours. Invertebrate immune systems role in the immune system essential to fitness and health of commercially valuable beneficial organisms; current and emerging knowledge of the invertebrate immune system and interactions with pathogens; key molecular pathways in immune recognition of pathogens, signaling, expression of effector molecules. **Prerequisites:** Graduate classification.

ENTO 681 Seminar

Credit 1. 1 Lecture Hour. Oral reports and discussions of current research and developments in entomology and related fields; designed to broaden understanding of problems in field and to stimulate research. **Prerequisite:** Graduate classification.

ENTO 684 Professional Internship

Credits 1 to 4. 1 to 4 Other Hours. On-the-job training in the fields of pest identification, home and garden pest control, medical and veterinary pest control, and pest management of food and fiber crop pests. **Prerequisite:** Graduate classification in the Master of Agriculture program in economic entomology or plant protection.

ENTO 685 Directed Studies

Credits 1 to 9. 1 to 9 Other Hours. Entomological problems not pertaining to thesis or dissertation. May be repeated for credit. **Prerequisites:** Graduate classification with major or minor in entomology; approval of department head.

ENTO 689 Special Topics in...

Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours. Selected topics in an identified area of entomology. May be repeated for credit. **Prerequisite:** Graduate classification.

ENTO 690 Theory of Research

Credit 1. 1 Lecture Hour. Examination of concepts and theories in entomological research including applications of novel technologies and experimental approach. May be repeated for credit. **Prerequisite:** Graduate classification.

ENTO 691 Research

Credits 1 to 23. 1 to 23 Other Hours. Research problems on taxonomy, life histories, biological control, ecology and physiology of insects, and toxicology of insecticides. **Prerequisite:** Graduate classification.