### ENTO - ENTOMOLOGY (ENTO)

### ENTO 101 Introduction to Academic Success in Entomology

**Credit 1. 1 Lecture Hour.** Orientation to academic success within higher education and specifically the Bachelor of Science degree in entomology; awareness of academic and campus support services available for student success; development of goals for academic and career planning, including creation and utilization of degree planner; awareness of personal self-management strategies, including learning styles, time management, goal setting, stress management and development of personal strategies for implementation of personal self-management into practice.

# ENTO 102 Continuing Academic Success in Entomology

**Credit 1. 1 Lecture Hour.** Continued exploration to academic success within higher education and specifically the Bachelor of Science degree in Entomology; increase awareness of academic and campus support services available for student success; development of goals for academic and career planning, including creation and utilization of degree planner; awareness of personal self-management strategies, including learning styles, time management, goal setting, stress management, and development of personal strategies for implementation of personal self-management into practice. Must be taken on a satisfactory/unsatisfactory basis. **Prerequisite:** ENTO 101.

### **ENTO 201 General Entomology**

**Credits 3. 2 Lecture Hours. 2 Lab Hours.** Survey of the major classes of arthropods with special emphasis on species of economic or biological importance; general insect anatomy, physiology, metamorphosis and classification; survey of the biologies of insect orders and major families using common injurious and beneficial species to relate material to production agriculture and the urban environment.

### ENTO 208 Veterinary Entomology

**Credits 2. 2 Lecture Hours.** Insects and their relatives causation of economic loss, impacts to well-being and transmission of disease pathogens to domestic and companion animals and wildlife as well as health and well-being of humans through occupational or recreational exposure; insect biology, economic importance and principles and methods of prevention and control. **Prerequisite:** Co-enrollment in ENTO 209.

#### ENTO 209 Veterinary Entomology Laboratory

**Credit 1. 2 Lab Hours.** Insects and their relatives causation of economic loss, impacts to well-being and transmission of disease pathogens to domestic and companion animals and wildlife, as well as health and well-being of humans through occupational or recreational exposure; laboratory emphasizes identification of major arthropod pests, use of microscopy and dissection equipment. **Prerequisite:** Concurrent enrollment with ENTO 208.

#### ENTO 210 Global Public Health Entomology

**Credits 3. 3 Lecture Hours.** Impacts of insects and insect-borne diseases on public health and well-being around the globe; insect biology, bloodfeeding, and transmission of human diseases; role of insect borne diseases on human history, socio-economic development, and public health infrastructure. **Prerequisite:** Freshman or sophomore classification or approval of instructor.

#### **ENTO 285 Directed Studies**

**Credits 0 to 4. 0 to 4 Other Hours.** Directed individual study in entomology. **Prerequisites:** Freshman or sophomore classification; approval of instructor and department head.

### ENTO 289 Special Topics in...

**Credits 1 to 4. 1 to 4 Lecture Hours.** Selected topics in an identified area of entomology. May be repeated for credit. **Prerequisite:** Approval of instructor.

### ENTO 291 Research

**Credits 0 to 4. 0 to 4 Other Hours.** Research conducted under the direction of faculty member in entomology. May be repeated for credit. **Prerequisites:** Freshman or sophomore classification and approval of instructor.

### ENTO 300/ECCB 300 Field Studies

**Credits 3. 3 Other Hours.** Integration of principles of animal and plant ecology with environmental factors to characterize wildlife populations; intensive analysis of specific areas will emphasize either the development of a wildlife management plan or a general vertebrate natural history survey. **Prerequisite:** Prior approval of instructor and concurrent enrollment in ECCB 450/ENTO 450 and ECCB 451/ENTO 451. **Cross Listing:** ECCB 300/ENTO 300.

# ENTO 301 Biodiversity and Biology of Insects

**Credits 4. 3 Lecture Hours. 3 Lab Hours.** Introduction to orders and most important families of insects; order-level morphology and family-level natural history; collection of insects identified to family level provides introduction to collection methods and specimen preparation. **Prerequisites:** ENTO 201, or ENTO 208 and ENTO 209; BIOL 111 and BIOL 112; junior or senior classification or approval of instructor.

#### **ENTO 305 Evolution of Insect Structure**

**Credits 3. 2 Lecture Hours. 3 Lab Hours.** External morphology of insects; evolution of form and function. **Prerequisite:** ENTO 201, or ENTO 208 and ENTO 209; BIOL 111.

### **ENTO 306 Insect Structure and Function**

**Credits 4. 3 Lecture Hours. 3 Lab Hours.** Physiology and morphology of insects; structure and function of internal organ systems and their role in insect success. **Prerequisite:** ENTO 201, or ENTO 208 and ENTO 209; BIOL 111 and BIOL 112; CHEM 101, CHEM 111, CHEM 102 and CHEM 112, or CHEM 119 and CHEM 120.

#### **ENTO 320 Honey Bee Biology**

**Credits 3. 3 Lecture Hours.** Introduction of honey bee biology and beekeeping practices to science and non-science majors; honey bees as the model insect to introduce general principles of biology and entomology. **Prerequisite:** Junior or senior classification or approval of instructor.

### ENTO 321 Beekeeping

**Credit 1. 3 Lab Hours.** Basic Knowledge and techniques used in apiculture; tools and knowledge needed to keep bees responsibly and productively. **Prerequisites:** ENTO 320 or concurrent enrollment, junior or senior classification or approval of instructor.

#### **ENTO 322 Insects and Human Society**

**Credits 3. 3 Lecture Hours.** Emphasis on the role insects have played in the development of human cultures; aspects include health, food production and storage, art, music and architecture; overview of historic, present day, and future roles insects will have on environmental movements (green societies), and in underdeveloped, developing and developed societies. **Prerequisite:** Junior or senior classification.

#### ENTO 401 Principles of Integrated Pest Management

**Credits 3. 2 Lecture Hours. 3 Lab Hours.** Integrated pest management (IPM) concepts, principles, development and application; IPM constitutes a series of pest control tactics and strategies toward more sustainable agriculture, natural resources, and urban and rural health and well-being. **Prerequisite:** ENTO 201, or ENTO 208 and ENTO 209.

### ENTO 402 Insects In Agriculture

**Credits 3. 2 Lecture Hours. 3 Lab Hours.** Examination of the biology and ecology of insect agricultural pests and the science underlying their management; exploration of the biology, taxonomy and management of insects as both pests and beneficial species in a range of agricultural systems. **Prerequisites:** Grade of C or better in ENTO 201 or approval of instructor.

#### ENTO 403 Urban Entomology

**Credits 3. 2 Lecture Hours. 3 Lab Hours.** Biology, economic importance and control strategies for arthropod pests commonly invading households and commercial structures in urban environments; laboratory consists of urban pest identification and special presentations and demonstrations covering topics related to urban pest problems and their control. Offered in 2011-2012 academic year and alternating years thereafter. Prerequisites: ENTO 201, or ENTO 208 and ENTO 209, or approval of instructor.

#### **ENTO 423 Medical Entomology**

**Credits 2. 2 Lecture Hours.** Biologies, disease relationships, and control of insects and other arthropods parasitic on or in humans; aspect of the fields of clinical and preventative medicine. **Prerequisites:** BIOL 111; ENTO 427 or concurrent enrollment; junior or senior classification.

#### ENTO 424 Insect Ecology

**Credits 3. 2 Lecture Hours. 3 Lab Hours.** Provides basic ecological background with an applied interpretation, emphasizing influences of insect populations and communities on ecosystem processes that influence landscape structure, function and change. **Prerequisites:** ENTO 201, or ENTO 208 and ENTO 209; BIOL 111; junior or senior classification or approval of instructor.

#### ENTO 425 Disease Ecology

**Credits 3. 3 Lecture Hours.** Ecological interactions that influence the distribution and abundance of pathogens, vectors, and hosts ultimately determine the spread of disease; impacts of urbanization, climate change, and other human influenced environmental changes on disease dynamics; integration of disease ecology into pathogen and vector monitoring and comprehensive strategies to reduce disease occurrence. **Prerequisite:** ENTO 208, ENTO 209 and ENTO 423; junior or senior classification, or approval of instructor.

#### ENTO 426/VIBS 426 Methods in Vector-Borne Disease Ecology

**Credits 3. 1 Lecture Hour. 5 Lab Hours.** Methodological understanding of how vector-borne diseases are studied in the field and laboratory; handson exploration of the ecology 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. **Prerequisites:** Junior or senior classification and approval of instructor. **Cross Listing:** VIBS 426/ENTO 426.

#### **ENTO 427 Medical Entomology Laboratory**

**Credit 1. 2 Lab Hours.** Morphological features of adults and immature stages of parasitic arthropods of medical importance; molecular techniques to determine infectious status of arthropod vectors. **Prerequisites:** BIOL 111; ENTO 423 or concurrent enrollment; junior or senior classification.

#### **ENTO 428 Insect Biotechnology**

**Credits 3. 3 Lecture Hours.** Applications of genetic engineering and biotechnology; specific problems dealing with insects and control of insect pests. **Prerequisites:** ENTO 429 or concurrent enrollment; GENE 301, GENE 315, GENE 320/BIMS 320, or FIVS 308; junior or senior classification or approval of instructor.

#### ENTO 429 Insect Biotechnology Laboratory

**Credit 1. 3 Lab Hours.** Basic technical experience in insect molecular biology and biotechnology, including genomic DNA isolation, PCR, cloning, sequencing and gene manipulation techniques; focus on insect applications for improvement of human health and agriculture. **Prerequisites:** ENTO 428 or concurrent enrollment; junior or senior classification or approval of instructor.

# ENTO 431/FIVS 431 The Science of Forensic Entomology

**Credits 3. 3 Lecture Hours.** Explores the science, methodology and technology employed to gather, preserve and present information about insects and other arthropods in such a manner that this information can be used in courts of law as evidence and testimony to help resolve issues of a criminal or civil nature. **Prerequisite:** Junior or senior classification or approval of instructor. **Cross Listing:** FIVS 431/ENTO 431.

#### ENTO 432/FIVS 432 Applied Forensic Entomology

**Credit 1. 3 Lab Hours.** Laboratory-based offering practical experience using scientific information, methodology, technology, and legal procedures inherent to the field of forensic entomology; emphasis on collecting, preserving, and identifying information as evidence and expert witness testimony in courts of law. **Prerequisites:** Junior or senior classification or approval of instructor. **Cross Listing:** FIVS 432/ENTO 432.

# ENTO 435 Case Studies in Problem Solving

**Credits 3. 3 Lecture Hours.** Development of reasoning strategies by examining a variety of case studies, science and scientific methods; solving real-world problems as part of an investigative team. **Prerequisite:** ENTO 201, or ENTO 208 and ENTO 209; ENTO 482; senior classification or approval of instructor.

### **ENTO 441 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 442 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:** Grade of C or better in BIOL 111 and BIOL 112; junior or senior classification.

# ENTO 450/ECCB 450 Caribbean Conservation

**Credits 2. 6 Lab Hours.** Provide experience in and appreciation for diverse tropical habitats and the problems associated with conserving these habitats; design and conduct individual research projects on topics of their choice with approval from the instructors on project design and feasibility. **Prerequisites:** Concurrent enrollment in ENTO 300/ECCB 300 and ENTO 451/ECCB 451; junior or senior classification. **Cross Listing:** ECCB 450/ENTO 450.

### ENTO 451/ECCB 451 Caribbean Research Seminar

**Credit 1. 1 Other Hour.** Document research activities; keep a journal of activities and research methods during study abroad trips. **Prerequisites:** Concurrent enrollment in ENTO 300/ECCB 300 and ENTO 450/ECCB 450; junior or senior classification. **Cross Listing:** ECCB 451/ENTO 451.

### ENTO 455 Field Entomology in the Tropics

**Credits 3. 9 Other Hours.** Intensive hands-on, field-based experiences in Costa Rica at the Texas A&M Soltis Center for Research and Education; study of insect diversity, behavior and natural history and insight into the challenges in conserving biodiversity; two-week course designed to provide authentic research experiences in a tropical rainforest; involvement in physically demanding fieldwork, extensive collecting and sampling, specimen sorting and preparation, as well as field observation of insect natural history and behavioral experiments; learn how to keep field notes, work in teams to solve research questions and communicate research through various media. **Prerequisites:** Grade of C or better in BIOL 111 and BIOL 112; or approval of instructor; any course in entomology recommended.

#### ENTO 481 Seminar

**Credit 1. 1 Lecture Hour.** Report of original investigations, current literature and special features of entomology. **Prerequisites:** ENTO 201, or ENTO 208 and ENTO 209; junior or senior classification.

# ENTO 482 Occupational and Professional Development

**Credits 2. 2 Lecture Hours.** Organized instruction in written and oral communication; acquaint students with private and public-sector companies and agencies as well as leading professionals from these firms to reinforce academic instruction and prepare students for the transition to employment, graduate and professional schools. **Prerequisite:** ENTO 201, or ENTO 208 and ENTO 209; or approval of instructor.

### **ENTO 484 Professional Internship**

**Credits 0 to 4. 0 to 4 Other Hours.** Independent study and supervised field experience related to a professional area of interest in entomology. May be taken two times for credit. **Prerequisite:** ENTO 201, or ENTO 208 and ENTO 209; junior or senior classification or approval of instructor.

#### **ENTO 485 Directed Studies**

**Credits 0 to 4. 0 to 4 Other Hours.** Individual problems. **Prerequisites:** Approval of instructor and department head.

#### ENTO 489 Special Topics in...

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

#### ENTO 491 Research

**Credits 0 to 4. 0 to 4 Other Hours.** Research conducted under the direction of faculty member in entomology. May be repeated for credit. **Prerequisites:** Junior or senior classification or approval of instructor.