

ENTOMOLOGY (ENT)

College of Agricultural & Environmental Sciences

ENT 001 – Art, Science & the World of Insects (3 units)

Course Description: Fusion of entomology and art to create an appreciation of insect biology, ecology, interactions with humans and importance in human culture. Multidisciplinary approaches in education and career paths in entomology and art will be highlighted.

Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).

Grade Mode: Letter.

General Education: Arts & Humanities (AH) or Science & Engineering (SE) or Social Sciences (SS); Oral Skills (OL); Visual Literacy (VL); Writing Experience (WE).

ENT 002 – Biodiversity (3 units)

Course Description: Introduction to nature, scope and geographical distribution of biodiversity (diversity of life, with emphasis on plants and animals, especially insects). Humans and biodiversity; domestication, aesthetics, ethics and valuation. Species richness and "success."

Biodiversity through time; monitoring, evaluation and conservation.

Biomes-global, continental and Californian.

Learning Activities: Lecture 2 hour(s), Lecture/Discussion 1 hour(s).

Cross Listing: EVE 002.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Scientific Literacy (SL); Writing Experience (WE).

ENT 010 – Natural History of Insects (3 units)

Course Description: Introduction to the insects detailing their great variety, structures and functions, habits, and their significance in relation to plants and animals including man. Designed for students not specializing in entomology.

Learning Activities: Lecture 3 hour(s).

Credit Limitation(s): Not open for credit to students who have had ENT 100, but students who have taken this course may take ENT 100 for credit.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Scientific Literacy (SL).

ENT 090X – Special Topics in Entomology (2 units)

Course Description: Freshman seminar course for indepth examination of a special topic within the subject area.

Prerequisite(s): Consent of instructor.

Learning Activities: Seminar 2 hour(s).

Repeat Credit: May be repeated 2 time(s).

Grade Mode: Pass/No Pass only.

ENT 092 – Internship (1-12 units)

Course Description: Work-learn experience on and off campus in all subject areas offered by the department, supervised by a member of the faculty.

Prerequisite(s): Consent of instructor.

Learning Activities: Variable 3-36 hour(s).

Repeat Credit: May be repeated 12 unit(s).

Grade Mode: Pass/No Pass only.

ENT 099 – Special Study for Undergraduates (1-5 units)

Course Description: Special study for undergraduates.

Learning Activities: Variable.

Grade Mode: Letter.

ENT 100 – General Entomology (4 units)

Course Description: Biology, anatomy, physiology, development, classification, ecology and relation of insects to human welfare.

Prerequisite(s): BIS 002B; or consent of instructor.

Learning Activities: Lecture 3 hour(s), Term Paper 1 hour(s).

Grade Mode: Letter.

ENT 100L – General Entomology Laboratory (2 units)

Course Description: Anatomy, development, population ecology, methods of collecting, classification and identification of insects of all orders and of major families.

Prerequisite(s): ENT 100 (can be concurrent).

Learning Activities: Laboratory 6 hour(s).

Grade Mode: Letter.

General Education: Visual Literacy (VL).

ENT 101 – Functional Insect Morphology (3 units)

Course Description: Study of the basic external and internal structures, organs and tissues of insects, with emphasis on functional systems.

Functional anatomy, histology and fine structures of important organs and tissues will be discussed.

Prerequisite(s): ENT 100.

Learning Activities: Lecture 2 hour(s), Laboratory 3 hour(s).

Grade Mode: Letter.

ENT 102 – Insect Physiology (4 units)

Course Description: Processes by which insects maintain themselves, reproduce, and adapt to environment. Insects as models for basic/ applied research through detailed analysis of metabolic, physiological, and behavioral processes. Emphasis on analysis of methodology, fact, and theory.

Prerequisite(s): ENT 100; or course in physiology or invertebrate zoology.

Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Writing Experience (WE).

ENT 103 – Insects Systematics (3 units)

Course Description: Principles and methods of systematics, with particular reference to insects. Emphasis on different theories of classification, and analysis of phylogenetic relationships.

Prerequisite(s): Introductory course in zoology or entomology.

Learning Activities: Lecture 2 hour(s), Discussion 1 hour(s).

Grade Mode: Letter.

ENT 104 – Behavioral Ecology of Insects (3 units)

Course Description: Basic principles and mechanisms of insect behavior and ecology. An evolutionary approach to understanding behavioral ecology of insects.

Prerequisite(s): Introductory biology or zoology.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

ENT 105 – Insect Ecology (4 units)

Course Description: Introduction to insect ecology combining fundamental concepts and questions in ecology with ideas, hypotheses and insights from insects. Integrates aspects of individual, population, community and ecosystem ecology.

Prerequisite(s): BIS 002B (can be concurrent); or consent of instructor.

Learning Activities: Lecture/Discussion 3 hour(s), Term Paper.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Scientific Literacy (SL); Writing Experience (WE).

ENT 107 – California Insect Diversity (5 units)

Course Description: Survey of the diversity of insects from selected ecological zones in California with emphasis on collection, identification, and natural history.

Prerequisite(s): An introductory course in entomology.

Learning Activities: Lecture 1 hour(s), Laboratory 6 hour(s), Fieldwork 6 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ENT 108 – Evolution & Ecology of Arachnids (3 units)

Course Description: Spider external morphology, functional anatomy, metabolism, neurobiology, development, predatory & reproductive behavior, ecology, phylogeny, systematics, zoogeography, and faunistics.

Prerequisite(s): BIS 002C or ENT 100

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

ENT 108L – Evolution & Ecology of Arachnids Laboratory (1 unit)

Course Description: Laboratory on spider natural history, identification, external morphology, and taxonomy, morphology and identification. Emphasis on the spiders of the California Floristic Province.

Prerequisite(s): (BIS 002C or ENT 100 or ENT 100L); ENT 108 (can be concurrent); ENT 108 required concurrently or consent of instructor.

Learning Activities: Discussion/Laboratory 1 hour(s).

Grade Mode: Letter.

ENT 109 – Field Taxonomy & Ecology (7 units)

Course Description: Study of insects in their natural habitats; their identification and ecology.

Prerequisite(s): An introductory course in entomology or consent of instructor.

Learning Activities: Lecture 2 hour(s), Laboratory 36 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ENT 110 – Arthropod Pest Management (5 units)

Course Description: Sustainable management & ecology of arthropod pests in agricultural systems. Techniques for effective management of arthropod pests via in-depth knowledge about pest biology, life strategies, spatial ecology, and food web functions. Lab & field trip exercises in applied research in pest management, ecology, and evolution using digital technologies (apps, remote sensing, cloud-based decision support).

Prerequisite(s): (STA 013 or STA 013Y or STA 100 C- or better); BIS 002B C- or better; or consent of instructor.

Learning Activities: Lecture 3 hour(s), Laboratory 6 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Writing Experience (WE).

ENT 111 – Chemical Ecology (3 units)

Course Description: Fundamental concepts in chemical ecology, classic and recent examples of chemical-mediated species interactions; introduction to the methods and techniques used in the field of chemical ecology.

Prerequisite(s): BIS 002B C- or better; CHE 002A C- or better; CHE 002B C- or better; or consent of instructor.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Scientific Literacy (SL).

ENT 117 – Longevity (4 units)

Course Description: Nature, origin, determinants, and limits of longevity with particular reference to humans; emphasis on implications of findings from non-human model systems including natural history, ecology and evolution of life span; description of basic demographic techniques including life table methods.

Prerequisite(s): Upper division standing or consent of instructor.

Learning Activities: Lecture 3 hour(s), Term Paper 1 hour(s).

Cross Listing: HDE 117.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Scientific Literacy (SL); Writing Experience (WE).

ENT 119 – Apiculture (3 units)

Course Description: Biology and behavior of honeybees; communication, orientation, social organization, foraging activities, honey production, pollination activities.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ENT 120 – Pollination Biology (3 units)

Course Description: Natural history, ecology, evolution and applications of pollination. Conceptual underpinnings and basic methodologies of pollination. Primary focus on animal-mediated pollination.

Prerequisite(s): BIS 002B C- or better; or consent of instructor. EVE 100 EVE 101 recommended.

Learning Activities: Discussion/Laboratory 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ENT 123 – Plant-Virus-Vector Interaction (3 units)

Course Description: Analysis of interactions necessary for viruses to infect plants. Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern approaches to the interdiction of viral movement.

Prerequisite(s): BIS 002A; (BIS 101 or BIS 101V); PLB 105, PLP 120, and ENT 100 recommended.

Learning Activities: Lecture 3 hour(s).

Cross Listing: PLB 123, PLP 123.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Scientific Literacy (SL); Writing Experience (WE).

ENT 135 – Introduction to Biological Control (4 units)

Course Description: Introduction to biological control.

Prerequisite(s): ENT 100 or ENT 110.

Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).

Grade Mode: Letter.

ENT 153 – Medical Entomology (3 units)

Course Description: Basic biology and classification of medically important arthropods with special emphasis on the ecology of arthropodborne diseases and principles of their control. Relationships of arthropods to human health.

Prerequisite(s): BIS 002A; BIS 002B; or consent of instructor; upper division standing in one of the biological sciences.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Scientific Literacy (SL); Writing Experience (WE).

ENT 153L – Lab Course in Medical Entomology (4 units)

Course Description: Medical entomology and vector control; physiology and identification of disease vectors; methods for trapping and sampling mosquitoes and ticks; techniques for testing insecticide resistance; utilization of online resources for epidemiological data analysis; inclusion of field trips for mosquito and tick collections and visits to vector control districts for practical insights.

Prerequisite(s): ENT 153 C or better; or consent of instructor.

Learning Activities: Discussion/Laboratory 4 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE); Quantitative Literacy (QL); Scientific Literacy (SL); Writing Experience (WE).

ENT 156 – Biology of Parasitism (3 units)

Course Description: Lectures on the biological and ecological aspects affecting host-parasite relationships using selected examples from protozoan and metazoan fauna.

Prerequisite(s): BIS 002A; or consent of instructor.

Learning Activities: Lecture/Discussion 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ENT 156L – Biology of Parasitism Laboratory (1 unit)

Course Description: Laboratory demonstrations using selected examples of protozoan and metazoan organisms along with various techniques used in parasitology to exemplify concepts presented in the lecture course.

Prerequisite(s): ENT 156 (can be concurrent); ENT 156 required concurrently or consent of instructor.

Learning Activities: Laboratory 3 hour(s).

Grade Mode: Letter.

General Education: Science & Engineering (SE).

ENT 158 – Forensic Entomology (3 units)

Course Description: Arthropods, their general biology, succession, developmental cycles and population biology in matters of criminal prosecution and civil litigation. Emphasis on basic arthropod biology, ecological and developmental concepts and methods, development of reasoning abilities, implication, development of opinions and evidence.

Prerequisite(s): ENT 100; or consent of instructor; upper division standing.

Learning Activities: Lecture 2 hour(s), Laboratory 4 hour(s).

Grade Mode: Letter.

General Education: Writing Experience (WE).

ENT 180A – Experimental Ecology & Evolution in the Field (4 units)

Course Description: Experimental design in field ecology. Examination of primary literature, experimental design, independent and collaborative research, analysis of data, development of original research paper based on field experiments.

Prerequisite(s): EVE 100 (can be concurrent); (ENT 105 (can be concurrent) or ESP 100 (can be concurrent) or EVE 101 (can be concurrent)); consent of instructor.

Learning Activities: Lecture/Lab 3 hour(s), Project 3 hour(s); Fieldwork.

Cross Listing: EVE 180A.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Quantitative Literacy (QL).

ENT 180B – Experimental Ecology & Evolution in the Field (4 units)

Course Description: Experimental design in field ecology. Examination of primary literature, experimental design, independent and collaborative research, analysis of data, development of original research paper based on field experiments.

Prerequisite(s): EVE 180A or ENT 180A.

Learning Activities: Lecture/Lab 3 hour(s), Project 3 hour(s); Fieldwork.

Cross Listing: EVE 180B.

Grade Mode: Letter.

General Education: Science & Engineering (SE); Quantitative Literacy (QL); Writing Experience (WE).

ENT 192 – Internship (1-12 units)

Course Description: Laboratory experience or fieldwork off and on campus in all subject areas offered in the Department of Entomology. Internships supervised by a member of the faculty.

Prerequisite(s): Consent of instructor; completion of 84 units.

Learning Activities: Internship 3-36 hour(s).

Grade Mode: Pass/No Pass only.

ENT 197T – Tutoring in Entomology (1-3 units)

Course Description: Leading small discussion groups. Preview assignments and prepare guidelines for discussion.

Learning Activities: Discussion 1-3 hour(s).

Grade Mode: Pass/No Pass only.

ENT 198 – Directed Group Study (1-5 units)

Course Description: Directed group study.

Prerequisite(s): Consent of instructor.

Learning Activities: Variable.

Grade Mode: Pass/No Pass only.

ENT 199 – Special Study for Advanced Undergraduates (1-5 units)

Course Description: Special study for advanced undergraduates.

Learning Activities: Variable.

Grade Mode: Pass/No Pass only.

ENT 212 – Molecular Biology of Insects & Insect Viruses (3 units)

Course Description: Molecular biological analysis of insect systematics, physiology, and defense mechanisms. Molecular biology of insect viruses. Baculovirus expression vectors and post-translation modification of expressed polypeptides. Biological control of using neuropeptides and toxin genes in insect viruses.

Prerequisite(s): Consent of instructor.

Learning Activities: Lecture 3 hour(s).

Grade Mode: Letter.

ENT 225 – Terrestrial Field Ecology (4 units)

Course Description: Field course conducted over spring break and four weekends at Bodega Bay, emphasizing student projects. Ecological hypothesis testing, data gathering, analysis, and written and oral presentation of results are stressed.

Prerequisite(s): Introductory ecology and introductory statistics or consent of instructor.

Learning Activities: Seminar 1 hour(s), Fieldwork 12 hour(s).

Cross Listing: ECL 225, PBG 225.

Grade Mode: Letter.

ENT 230 – Advanced Biological Control (4 units)

Course Description: Principles and current issues in biological control of arthropod pests and weeds; laboratory devoted to identification and life history of the major groups of parasitic and predaceous arthropods.

Prerequisite(s): Graduate or upper division standing in biological science or consent of instructor.

Learning Activities: Lecture 2 hour(s), Laboratory 6 hour(s).

Grade Mode: Letter.

ENT 253 – Advanced Medical Entomology (3 units)

Course Description: An analysis of several arthropod-borne human diseases with emphasis on the relationships of the biology of the vector to the ecology of the disease. Discussion includes demonstration of vectors and techniques.

Prerequisite(s): One upper division ENT course (other than ENT 153) and one course in Microbiology; ENT 153 strongly recommended.

Learning Activities: Lecture 2 hour(s), Discussion 1 hour(s).

Grade Mode: Letter.

ENT 290 – Exploratory Topics in Entomology (2 units)

Course Description: Interdisciplinary topics in entomology, including innovative applications of entomological concepts to other fields of research and human endeavor (e.g. medicine, technology, art, criminology).

Learning Activities: Seminar 2 hour(s).

Repeat Credit: May be repeated 8 unit(s) when topic differs.

Grade Mode: Letter.

ENT 291 – Current Topics in Medical & Veterinary Entomology (2 units)

Course Description: Discussions of parasitology, ecology and epidemiology related to vectors of pathogens causing disease in humans and animals.

Prerequisite(s): ENT 153.

Learning Activities: Seminar 2 hour(s).

Repeat Credit: May be repeated 1 time(s).

Grade Mode: Letter.

ENT 292 – Current Topics in Insect Physiology & Behavior (2 units)

Course Description: Analysis of contemporary advances in insect physiology, biochemistry and/or behavior. Interpretation and description of physiological and behavioral mechanisms and functions. Application of general principles to solution of problems in the laboratory and field.

Prerequisite(s): ENT 102 if topic is physiology, a course in behavior if topic is behavior, or either if topic bridges both.

Learning Activities: Seminar 2 hour(s).

Repeat Credit: May be repeated 8 unit(s) when topic differs.

Grade Mode: Letter.

ENT 293N – Current Topics in Insect Biotechnology & Genomics (2 units)

Course Description: Discussion of advances in insect biotechnology, including genetic engineering and genomics.

Prerequisite(s): ENT 212.

Learning Activities: Seminar 2 hour(s).

Repeat Credit: May be repeated 6 unit(s) when topic differs.

Grade Mode: Letter.

ENT 294 – Current Topics in Insect Ecology, Evolution, & Systematics (2 units)

Course Description: Discussions of advanced topics in ecology, evolution and systematics with emphasis on analysis of factors influencing the distribution, abundance, adaptations and evolutionary relationships of insects. Includes consideration of applications of basic theory; e.g. biological control.

Prerequisite(s): ENT 103; general course in ecology or evolution.

Learning Activities: Seminar 2 hour(s).

Repeat Credit: May be repeated 8 unit(s) when topic differs.

Grade Mode: Letter.

ENT 295 – Current Topics in Agricultural Entomology & Bee Biology (2 units)

Course Description: Discussion of advanced topics about the biology, ecology, behavior, and management of pest and beneficial insects.

Prerequisite(s): ENT 110 if topic relates to pests and beneficial predators; ENT 119 if topic is bee biology; either if topic bridges both.

Learning Activities: Seminar 2 hour(s).

Repeat Credit: May be repeated 8 unit(s) when topic differs.

Grade Mode: Letter.

ENT 297N – Seminar in Entomology (1 unit)

Course Description: Weekly Entomology seminar.

Learning Activities: Seminar 1 hour(s).

Repeat Credit: May be repeated 9 unit(s) when topic differs.

Grade Mode: Satisfactory/Unsatisfactory only.

ENT 298 – Group Study (1-5 units)

Course Description: Group study.

Learning Activities: Variable.

Grade Mode: Satisfactory/Unsatisfactory only.

ENT 299 – Research (1-12 units)

Course Description: Research.

Learning Activities: Variable.

Grade Mode: Satisfactory/Unsatisfactory only.