The mission for the Department of Entomology and Plant Pathology is to discover, develop and disseminate science-based knowledge concerning arthropods and plant pathogens. Entomology is the science and study of insects and related arthropods. Plant Pathology is the science and study of bacteria, viruses, fungi, and nematodes that cause diseases in plants. A strong academic background in the physical and biological sciences is essential for success in both disciplines. Research and education programs range from basic studies of cellular, physiological and genetic aspects to broad ecological and population studies and focus on the development of practical pest management strategies.

The undergraduate program in entomology leads to the BS in Entomology and offers students opportunities to explore the diversity of nature through the study of arthropods and their interactions with plants, animals and human culture. Specialized course work in entomology includes insect identification, biology, ecology, physiology, biochemistry, population dynamics, medical and veterinary entomology, and insect pest management.

Plant pathology as a discipline encompasses the science required to understand the causes of plant diseases as well as prevention and controlling diseases. Undergraduate level courses are available in Plant Pathology and are valuable additions to programs in entomology, horticulture, agronomy, ecology and botany. Specialized course work in plant pathology includes pathogen identification, genetics, host pathogen physiology, biotechnology, molecular genetics and disease management.

There are many, and diverse, career opportunities for graduates of these programs, including positions involved with pest management in crops and livestock production, stored products such as grains and processed foods and protecting structural systems such as houses from termites and agricultural biotechnology. Undergraduate options in entomology include insect biology and ecology, bioforensics, and pre-medical/pre-veterinary sciences. Undergraduates of the entomology program are prepared to enter graduate programs in several disciplines, including entomology and plant pathology and have been successful in seeking and receiving professional degrees in medical and veterinary science programs. Others gain employment with private industry, research laboratories or county, state or federal agencies. Some develop their own businesses as consultants and/or entrepreneurs.

### Minor in Entomology

This minor is designed to provide students with a basic understanding of insect biology, ecology and classification. Students are also instructed on applications of Entomology related to ecosystem function, conservation and agricultural impacts. Directed electives in this major also allow students to explore aspects of insect behavior, aquatic entomology, specific applications of entomology in horticulture, forestry, agronomy, structural, urban and stored product scenarios. Requirements of the minor include 15 hours from core courses.

### Minor in Pest Management

This minor is designed to introduce students to pests including insects, plant pathogens and weeds that damage, reduce the quality, or increase production costs of agricultural crops or livestock, turf or ornamental plants, and trees. Integrated management methods for these pests are presented including cultural, biological and chemical control strategies.

The minor is intended for students majoring in horticulture, plant and soil science, natural resource ecology and management, animal science, environmental science, entomology, or other majors in biological sciences. Requirements of the minor include 18 hours with 9-12 hours from core courses.

### Courses

**ENTO 2001 Introduction to Entomological Research**

**Description:** Familiarize entomology majors with the department, faculty, and other students. Experience a broad overview of the field of entomology and how a degree in entomology can prepare you for many different opportunities and career paths.

**Credit hours:** 1

**Contact hours:** Lecture: 1 Contact: 1

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Entomology & Plant Pathology

**ENTO 2003 Insects and Society (N)**


**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Entomology & Plant Pathology

**General Education and other Course Attributes:** Natural Sciences

**ENTO 2143 Global Agricultural Biosecurity and Forensics**

**Description:** Biosecurity vs. biosafety; bioterrorism vs. biocrimes; microbial forensics; globalization; international trade and emerging organisms; invasive species; quarantine; responses; surveillance; detection and diagnostics; risk analysis; the biosecurity system integrated to science and agricultural specialties, economics and defense. Same course as PLP 2143.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Entomology & Plant Pathology

**ENTO 2223 Insects in Global Public Health (N)**

**Description:** Biology of diseases carried by arthropods, including their historical and societal impacts focusing on the intersection of arthropod and human biology.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Entomology & Plant Pathology

**General Education and other Course Attributes:** Natural Sciences
ENTO 2993 Introduction to Entomology (LN)
Description: Basic biology and classification of insects and closely related animals. Overview of the ecological roles of insects in both natural and managed ecosystems. Previously offered as ENTO 2992 and ENTO 2023.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology

ENTO 2993 Introduction to Entomology (LN)
Description: Basic biology and classification of insects and closely related animals. Overview of the ecological roles of insects in both natural and managed ecosystems. Previously offered as ENTO 2992 and ENTO 2023.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology

ENTO 3001 Research Skills in Entomology
Description: Introduction to research opportunities in field and laboratory entomology. Focus on literature review, hypothesis formation, and development of a grant proposal.
Credit hours: 1
Contact hours: Lecture: 1 Contact: 1
Levels: Undergraduate
Schedule types: Lecture
Department/School: Entomology & Plant Pathology

ENTO 3003 Livestock Entomology
Description: Economic importance, biology and control of pests affecting domestic animals. Biology of diseases carried by arthropods, including their impacts focusing on the intersection of arthropod and animal biology. Previously offered as ENTO 2091.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Entomology & Plant Pathology

ENTO 3021 Postharvest, Structural, and Urban Arthropod Pests
Prerequisites: ENTO 2993.
Description: The biology and management of insect pests of bulk-stored grains, flour, feed, dried fruits and nuts within food processing plants, warehouses, wholesale and retail distribution systems. Common structural and urban arthropod pests found in and around man-made buildings and their identification, biology and standard management practices.
Credit hours: 1
Contact hours: Lab: 2 Contact: 2
Levels: Undergraduate
Schedule types: Lab
Department/School: Entomology & Plant Pathology

ENTO 3044 Insect Morphology and Physiology
Prerequisites: ENTO 2993 Introduction to Entomology.
Description: Morphology and function of insects and their organ systems and use of selected techniques for the study of insect physiology. May not be used for degree credit with ENTO 5044.
Credit hours: 4
Contact hours: Lecture: 3 Lab: 3 Contact: 6
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology

ENTO 3331 Insect Pests of Agronomic Crops
Prerequisites: ENTO 2993 or concurrent enrollment.
Description: A survey of important arthropods or agronomic crops commonly grown in Oklahoma. Coverage includes identification of pests and beneficial insects, recognition of damage symptoms, discussion of sampling strategies and decision-making processes for management, and integrated pest management tactics.
Credit hours: 1
Contact hours: Lab: 2 Contact: 2
Levels: Undergraduate
Schedule types: Lab
Department/School: Entomology & Plant Pathology

ENTO 3421 Horticultural Insects
Prerequisites: ENTO 2993 or concurrent enrollment.
Description: Identification, biology and control of pests attacking horticultural crops. Emphasis on pests injurious to vegetables, fruits, pecans, greenhouse plants, turf and ornamental trees and shrubs.
Credit hours: 1
Contact hours: Lab: 2 Contact: 2
Levels: Undergraduate
Schedule types: Lab
Department/School: Entomology & Plant Pathology

ENTO 3461 Insects in Forest Ecosystems
Prerequisites: ENTO 2993 or concurrent enrollment.
Description: Identification and seasonal life history of insect pests and beneficial insects on shade trees in urban settings, in commercial forests, and in forest products.
Credit hours: 1
Contact hours: Lab: 2 Contact: 2
Levels: Undergraduate
Schedule types: Lab
Department/School: Entomology & Plant Pathology

ENTO 3501 Entomology for Educators
Description: Hands-on laboratory course designed to provide high school science teachers, FFA or 4H leaders with all of the resources and background information needed to use insects as a model to teach scientific concepts. Curriculum and resources are provided at the level of 7-12th grade and may be adapted to other levels as needed.
Credit hours: 1
Contact hours: Lab: 2 Contact: 2
Levels: Undergraduate
Schedule types: Lab
Department/School: Entomology & Plant Pathology

ENTO 3541 Insect Pests of Orchard Crops
Prerequisites: ENTO 2993 or concurrent enrollment.
Description: A survey of important arthropods or orchard crops commonly grown in Oklahoma. Coverage includes identification of pests and beneficial insects, recognition of damage symptoms, discussion of sampling strategies and decision-making processes for management, and integrated pest management tactics.
Credit hours: 1
Contact hours: Lab: 2 Contact: 2
Levels: Undergraduate
Schedule types: Lab
Department/School: Entomology & Plant Pathology

ENTO 3644 Insect Morphology
Prerequisites: ENTO 2993 or equivalent.
Description: Insect development and comparative morphology. Offered in combination with 5644. No credit for both ENTO 3644 and ENTO 5644.
Credit hours: 4
Contact hours: Lecture: 2 Lab: 4 Contact: 6
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology
ENTO 3663 Turfgrass Integrated Pest Management
Prerequisites: PLP 3343 or ENTO 2993.
Description: The biology, ecology, and identification of fungal, nematode, and insect turfgrass pests. Contemporary concepts and applications of integrated control practices available for managing turfgrass pests along with decision-making tools for use in turfgrass pest management programs. Same course as PLP 3663.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology

ENTO 4223 Ecological Methodology
Prerequisites: One course in either ecology or general biology.
Description: Use of insects and other invertebrates for describing and evaluating interactions of individuals and populations with their environments. Coverage of behavioral and physiological ecology on consequences to individuals; population and community ecology considered in dynamics of groups of organisms in ecosystems. May not be used for Degree Credit with ENTO 5223.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology

ENTO 4400 Special Topics
Prerequisites: Consent of instructor.
Description: Special topics in plant pathology, entomology or related fields. Same course as PLP 4400. Offered for variable credit, 1-3 credit hours, maximum of 3 credit hours.
Credit hours: 1-3
Contact hours: Contact: 1-3 Other: 1-3
Levels: Undergraduate
Schedule types: Independent Study
Department/School: Entomology & Plant Pathology

ENTO 4464 Insect Biology and Classification
Prerequisites: ENTO 2993 or equivalent or consent of instructor.
Description: Insect phylogeny, taxonomy, behavior, morphology and physiology in the context of ecosystem function. Major roles of insects in shaping ecosystem diversity, as indicators of environmental integrity, and as vectors of plant and animal pathogens and parasites.
Credit hours: 4
Contact hours: Lecture: 2 Lab: 4 Contact: 6
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology

ENTO 4484 Aquatic Entomology
Prerequisites: ENTO 2993 or instructor permission.
Description: Biology, taxonomy and ecology of insects and other invertebrates, inhabiting freshwater environments. Identification and biology of individual taxa. Roles of insects in aquatic ecology, as a forage base. May not be used for degree credit with ENTO 5484 or ZOOL 5484. Same course as ZOOL 4484. Previously offered as ENTO 4483.
Credit hours: 4
Contact hours: Lecture: 3 Lab: 2 Contact: 5
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology

ENTO 4513 Biological Control
Prerequisites: ENTO 2993 or equivalent or consent of instructor.
Description: The ecological principles and applied practices of biological control of insects and weeds. Principles include the scientific basis of biological control; natural enemies and their biology; biological control methods; and biological control in invasive species and pest management programs. May not be used for degree credit with ENTO 5513.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology

ENTO 4573 Introduction to Forensic Entomology
Description: The role of arthropods in decomposition, the use of forensic entomology in criminal and civil investigations and the increasing importance of forensic science on society; material includes content that some students may find disturbing. May not be used for degree credit with ENTO 5573.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Entomology & Plant Pathology

ENTO 4733 Insect Behavior and Chemical Ecology
Prerequisites: ENTO 2993 and CHEM 3015 or equivalent.
Description: Behavioral biology of insects. Ecological interactions among organisms mediated by naturally produced chemicals. An interface of ecology, behavior, physiology and chemistry with examples from animals, plants and microorganisms. Origin, function, significance and utilization of semiochemicals such as pheromones and allelochemicals. No credit for students with credit in ENTO 5733.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Entomology & Plant Pathology

ENTO 4800 Entomology Practicum
Prerequisites: Consent of instructor.
Description: Supervised research or extension experience with faculty in the Entomology/Plant Pathology Dept. or with approved governmental agencies or private employers. Written report required at close of practicum. Offered for variable credit, 1-4 credit hours, maximum of 4 credit hours.
Credit hours: 1-4
Contact hours: Contact: 1-4 Other: 1-4
Levels: Undergraduate
Schedule types: Independent Study
Department/School: Entomology & Plant Pathology

ENTO 4854 Medical and Veterinary Entomology
Prerequisites: ENTO 2993 or consent of instructor.
Description: Biology and control of arthropod vectors of disease and the diseases carried by arthropods. Course includes emphasis on scientific writing skills. No credit for students with credit in ENTO 5854.
Credit hours: 4
Contact hours: Lecture: 3 Lab: 4 Contact: 7
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology
ENTO 4923 Applications of Biotechnology in Pest Management
Prerequisites: BIOL 1114 or (BIOL 1113 and BIOL 1111) and CHEM 1215 or equivalents.
Description: Applications of biotechnology in managing arthropod pests of plants, animals, plant pathogens, and weeds. Introduction to underlying technology, products being developed and deployed, effectiveness and associated problems or concerns resulting from their use. Same course as PLP 4923 and PLNT 4923. Previously offered as ENTO 4992. May not be used for Degree Credit with ENTO 5923.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Entomology & Plant Pathology

ENTO 5000 Master's Research and Thesis
Description: Research in entomology. Offered for variable credit, 1-6 credit hours, maximum of 6 credit hours.
Credit hours: 1-6
Contact hours: Contact: 1-6 Other: 1-6
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomology & Plant Pathology

ENTO 5003 Insect Biochemistry
Prerequisites: BIOC 3653 or equivalent or consent of instructor.
Description: Biochemical processes in insects and closely related arthropods with emphasis on pathways unique to this group. Biochemical aspects of arthropod-microbe and arthropod-host interactions.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Entomology & Plant Pathology

ENTO 5020 Special Problems
Prerequisites: Graduate standing.
Description: Selected studies in the area of entomology, acarology or araneology. Offered for variable credit, 1-8 credit hours, maximum of 8 credit hours.
Credit hours: 1-8
Contact hours: Contact: 1-8 Other: 1-8
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomology & Plant Pathology

ENTO 5044 Insect Morphology and Physiology
Prerequisites: ENTO 2993 Introduction to Entomology.
Description: Functions of the organ systems and demonstration of selected techniques for study of insect physiology. Offered in combination with ENTO 3044. May not be used for degree credit with ENTO 3044. Previously offered as ENTO 5043.
Credit hours: 4
Contact hours: Lecture: 3 Lab: 3 Contact: 6
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology

ENTO 5223 Ecological Methodology
Prerequisites: One course in either ecology or general biology.
Description: Use of insects and other invertebrates for describing and evaluating interactions of individuals and populations with their environments. Coverage of behavioral and physiological ecology on consequences to individuals; population and community ecology considered in dynamics of groups of organisms in ecosystems. May not be used for Degree Credit with ENTO 4223.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology

ENTO 5464 Insect Biology and Classification
Prerequisites: ENTO 2993 or equivalent or consent of instructor.
Description: Insect phylogeny, taxonomy, behavior, morphology and physiology in the context of ecosystem function. Major roles of insects in shaping ecosystem diversity, as indicators of environmental integrity, and as vectors of plant and animal pathogens and parasites. No credit for students with credit in ENTO 4464.
Credit hours: 4
Contact hours: Lecture: 2 Lab: 4 Contact: 6
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology

ENTO 5484 Aquatic Entomology
Prerequisites: ENTO 2993 or instructor permission.
Description: Biology, taxonomy and ecology of insects and other invertebrates, inhabiting freshwater environments. Identification and biology of individual taxa. Roles of insects in aquatic ecology, as a forage base, and as indicators of biotic integrity of aquatic systems. May not be used for degree credit with ENTO 4484 or ZOOL 4484. Same course as ZOOL 5484. Previously offered as ENTO 4583.
Credit hours: 4
Contact hours: Lecture: 3 Lab: 2 Contact: 5
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology

ENTO 5501 Entomology For Educators
Description: Hands-on laboratory course designed to provide educators (teachers, FFA or 4H leaders, etc.) with all of the resources and background information needed to use insects as a model to teach scientific concepts. No credit given for students who have taken ENTO 3501.
Credit hours: 1
Contact hours: Lab: 2 Contact: 2
Levels: Graduate
Schedule types: Lab
Department/School: Entomology & Plant Pathology
ENTO 5513 Biological Control
Prerequisites: ENTO 4464 or equivalent or consent of instructor.
Description: The ecological principles and applied practices of biological control of insects and weeds. Principles include the scientific basis of biological control; natural enemies and their biology; biological control methods; and biological control in invasive species and past management programs. May not be used for degree credit with ENTO 4513. Previously offered as ENTO 5512.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology

ENTO 5523 Integrated Management of Insect Pests and Pathogens
Prerequisites: ENTO 2993 and PLP 3344.
Description: Modern theory and practices for management of insect pests and pathogens in plant production systems, emphasizing an ecologically-based, integrated approach. Basic concepts of pest management, decision-making, cost/benefit analysis and risk/benefit analytics. Previously offered as ENTO 5524.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

ENTO 5550 Advanced Agronomic Entomology
Prerequisites: ENTO 4523.
Description: Special problems in advanced agronomic entomology. Offered for variable credit, 1-5 credit hours, maximum of 5 credit hours.
Credit hours: 1-5
Contact hours: Contact: 1-5 Other: 1-5
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomology & Plant Pathology

ENTO 5573 Introduction to Forensic Entomology
Description: The role of arthropods in decomposition, the use of forensic entomology in criminal and civil investigations and the increasing importance of forensic science on society; material includes content that some students may find disturbing. May not be used for degree credit with ENTO 4573.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Entomology & Plant Pathology

ENTO 5613 Host Plant Resistance
Prerequisites: ENTO 2993 and PLP 3343 or equivalent and a general genetics course; or consent of instructor.
Description: Interactions of plants and the herbivorous insects and pathogenic micro-organisms that attack them. Development and deployment of multiple-pest resistant cultivars in crop management systems. Same course as PLP 5613. Previously offered as ENTO 5612.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology

ENTO 5623 Advanced Biotechnology Methods
Prerequisites: BIOC 3653, BIOL 3023 or equivalent or consent of instructor.
Description: Principles of biotechnology and laboratory experience with basic experimental techniques used in biochemical and molecular biological research. Same course as PLP 5623.
Credit hours: 3
Contact hours: Lecture: 1 Lab: 4 Contact: 5
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology

ENTO 5644 Insect Morphology
Prerequisites: ENTO 2993 or equivalent.
Description: Insect development and comparative morphology. Offered in combination with ENTO 3644. No credit for both ENTO 3644 and ENTO 5644.
Credit hours: 4
Contact hours: Lecture: 2 Lab: 4 Contact: 6
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology

ENTO 5700 Teaching Practicum in Entomology
Prerequisites: Graduate student standing.
Description: Variable credit offering for graduate students who wish to develop skills in teaching, assessment and curriculum development in conjunction with a primary instructor. Offered for variable credit, 1-6 credit hours, maximum of 6 credit hours.
Credit hours: 1-6
Contact hours: Contact: 1-6 Other: 1-6
Levels: Graduate
Schedule types: Discussion
Department/School: Entomology & Plant Pathology

ENTO 5710 Advanced Medical and Veterinary Entomology
Prerequisites: ENTO 4854.
Description: Special problems in methods of disease transmission, animal parasite control and the relationships existing between parasite and host. Offered for variable credit, 1-5 credit hours, maximum of 5 credit hours.
Credit hours: 1-5
Contact hours: Contact: 1-5 Other: 1-5
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomology & Plant Pathology

ENTO 5733 Insect Behavior and Chemical Ecology
Prerequisites: ENTO 2993 and CHEM 3015 or equivalent.
Description: Behavioral biology of insects. Ecological interactions among organisms mediated by naturally produced chemicals. An interface of ecology, behavior, physiology and chemistry with examples from animals, plants and microorganisms. Origin, function, significance and utilization of semiochemicals such as pheromones and allelochemicals. No credit for students with credit in ENTO 4733.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Entomology & Plant Pathology
ENTO 5753 Insecticide Toxicology
Prerequisites: Organic chemistry or 15 credit hours biology.
Description: Properties and mode of action of the major insecticidal materials. Assessment of their impact on the environment.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Entomology & Plant Pathology

ENTO 5833 Insect Molecular Biology
Prerequisites: ENTO 2993 and BIOL 3024 or equivalent or consent of instructor.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Entomology & Plant Pathology

ENTO 5850 Epidemiology of Arthropod-Borne Diseases
Prerequisites: ENTO 4854 or equivalent.
Description: The relationships existing between the hosts, arthropod vectors and causal agents of disease and the principles of disease prevention or suppression by the intelligent use of biological principles. Offered for variable credit, 1-4 credit hours, maximum of 4 credit hours.
Credit hours: 1-4
Contact hours: Contact: 1-4 Other: 1-4
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomology & Plant Pathology

ENTO 5870 Scientific Presentations
Prerequisites: Consent of instructor.
Description: Preparation and delivery of scientific presentations including 50-minute seminars, 10-minute talks, and posters. Same course as PLP 5870 Offered for variable credit, 1-5 credit hours, maximum of 5 credit hours.
Credit hours: 1-5
Contact hours: Contact: 1-5 Other: 1-5
Levels: Graduate
Schedule types: Discussion
Department/School: Entomology & Plant Pathology

ENTO 5923 Applications of Biotechnology in Pest Management
Prerequisites: BIOL 1114 or (BIOL 1113 and BIOL 1111) and CHEM 1215 or equivalents.
Description: Applications of biotechnology in managing arthropod pests of plants, animals, plant pathogens, and weeds. Introduction to underlying technology, products being developed and deployed, effectiveness and associated problems or concerns resulting from their use. May not be used for degree credit with ENTO 4923.
Credit hours: 3
Contact hours: Lecture: 3 Contact: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Entomology & Plant Pathology

ENTO 5992 Career Skills and Professionalism for Scientists
Prerequisites: Graduate standing.
Description: For graduate students majoring in science-based fields, especially those nearing graduation. Skills needed for effective job application and interviewing, career development and advancement, communication with professional colleagues and the public, and personal professional development. Same course as PLP 5992.
Credit hours: 2
Contact hours: Lecture: 2 Contact: 2
Levels: Graduate
Schedule types: Lecture
Department/School: Entomology & Plant Pathology

PLP 2143 Global Agricultural Biosecurity and Forensics
Prerequisites: BIOL 1104 or equivalent.
Description: Biosecurity vs. biosafety; bioterrorism vs. biocrimes; microbial forensics; globalization; international trade and emerging organisms; invasive species; quarantine; responses; surveillance; detection and diagnostics; risk analysis; the biosecurity system integrated to science and agricultural specialties, economics and defense. Same course as ENTO 2143.
Credit hours: 3
Contact hours: Lecture: 3 Other: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Entomology & Plant Pathology

ENTO 6000 Doctoral Research and Dissertation
Prerequisites: MS in entomology or consent of major professor.
Description: Independent investigation under the direction and supervision of a major professor. Offered for variable credit, 1-10 credit hours, maximum of 36 credit hours.
Credit hours: 1-10
Contact hours: Contact: 1-10 Other: 1-10
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomology & Plant Pathology

PLP 3343 Principles of Plant Pathology
Prerequisites: PBIO 1404 or MICR 2123 or HORT 1113 or PLNT 213.
Description: Introduction to basic principles and concepts of plant pathology, including the nature, cause and control of biotic and environmentally induced plant diseases, with emphasis on principles and methods of disease management. Offered in combination with PLP 5343. No credit for both PLP 3343 and PLP 5343. Previously offered as PLP 3344.
Credit hours: 3
Contact hours: Lecture: 2 Other: 2
Levels: Undergraduate
Schedule types: Lecture, Lab, Combined lecture and lab
Department/School: Entomology & Plant Pathology
PLP 3553 Fungi: Myths and More  
**Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111) or equivalent.  
**Description:** Fungal biology covering environmental roles and impacts on the health and nutrition of plants, animals and humans. Ethnomycological and industrial uses of fungi in foods, medicines, and intoxicants, and associated folklore and myths. Microscopy, microbiological methods, mushroom cultivation, and identification of microfungi and wild mushrooms. Same course as BOT 3553 or PBIO 3553.  
**Credit hours:** 3  
**Contact hours:** Lecture: 2 Lab: 2 Contact: 4  
**Levels:** Undergraduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Entomology & Plant Pathology  

PLP 3663 Turfgrass Integrated Pest Management  
**Prerequisites:** PLP 3343, ENTO 2993.  
**Description:** The biology, ecology and identification of fungal, nematode and insect turfgrass pests. Contemporary concepts and applications of integrated control practices available for managing turfgrass pests presented along with decision-making tools for use in turfgrass pest management programs. Same course as ENTO 3663.  
**Credit hours:** 3  
**Contact hours:** Lecture: 2 Lab: 2 Contact: 4  
**Levels:** Undergraduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Entomology & Plant Pathology  

PLP 4400 Special Topics  
**Prerequisites:** Consent of instructor.  
**Description:** Special topics in Plant Pathology, Entomology or related fields. Same course as ENTO 4400. Offered for variable credit, 1-3 credit hours, maximum of 3 credit hours.  
**Credit hours:** 1-3  
**Contact hours:** Contact: 1-3 Other: 1-3  
**Levels:** Undergraduate  
**Schedule types:** Independent Study  
**Department/School:** Entomology & Plant Pathology  

PLP 4923 Applications of Biotechnology in Pest Management  
**Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111) and CHEM 1215 or equivalent.  
**Description:** Applications of biotechnology in controlling arthropod pests of plants and animals, plant pathogens, and weeds. Introduction to underlying technology, products being developed and deployed, their effectiveness and associated problems or concerns resulting from their use. Same course as ENTO 4923 and PLNT 4923. Previously offered as PLP 4922. May not be used for degree credit with PLP 5923.  
**Credit hours:** 3  
**Contact hours:** Lecture: 3 Contact: 3  
**Levels:** Undergraduate  
**Schedule types:** Lecture  
**Department/School:** Entomology & Plant Pathology  

PLP 5000 Research  
**Description:** Research for the MS degree Offered for variable credit, 1-6 credit hours, maximum of 6 credit hours.  
**Credit hours:** 1-6  
**Contact hours:** Contact: 1-6 Other: 1-6  
**Levels:** Graduate  
**Schedule types:** Independent Study  
**Department/School:** Entomology & Plant Pathology  

PLP 5003 Plant Nematology  
**Prerequisites:** PLP 3343 or concurrent enrollment.  
**Description:** General morphology, taxonomy and biomics of nonparasitic and plant parasitic nematodes. Plant parasitic nematode assay techniques, subfamily identification, symptomology, pathogenicity and control. Previously offered as PLP 5004.  
**Credit hours:** 3  
**Contact hours:** Lecture: 2 Lab: 2 Contact: 4  
**Levels:** Graduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Entomology & Plant Pathology  

PLP 5014 Plant Virology  
**Prerequisites:** PLP 3343 or MICR 2125 or PLNT 2013 or instructor permission.  
**Description:** Plant viruses as causal agents of plant diseases. Taxonomy, biological, chemical, and physiological properties; transmission; host-virus and vector-virus relationships; replication; molecular virology; detection, diagnosis, ecology, biosecurity. Lab, primer design for RT-PCR and isothermal methods; serology. Previously offered as PLP 5013. May not be used for degree credit with MICR 5123.  
**Credit hours:** 4  
**Contact hours:** Lecture: 3 Lab: 2 Contact: 5  
**Levels:** Graduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Entomology & Plant Pathology  

PLP 5104 Mycology  
**Prerequisites:** Graduate standing.  
**Description:** A systematic study of the fungi, with emphasis on taxonomy, comparative morphology and fungal biology. Same course as BOT 5104 or PBIO 5104.  
**Credit hours:** 4  
**Contact hours:** Lecture: 3 Lab: 2 Contact: 5  
**Levels:** Graduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Entomology & Plant Pathology  

PLP 5304 Phytophthora  
**Prerequisites:** PLP 3343.  
**Description:** Bacteria as plant pathogens, with examination of the taxonomy, genetics, ecology, physiology, host-parasite interaction, and control of phytophthora.  
**Credit hours:** 4  
**Contact hours:** Lecture: 2 Lab: 4 Contact: 6  
**Levels:** Graduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Entomology & Plant Pathology  

PLP 5343 Principles of Plant Pathology  
**Prerequisites:** PBIO 1404 or MICR 2123 or HORT 1113 or PLNT 2013.  
**Description:** Introduction to basic principles and concepts of plant pathology, including the nature, cause and control of biotic and environmentally induced plant diseases. Offered in combination with PLP 3343. No credit for both PLP 3343 and PLP 5343. Graduate students will be expected to complete extra assignments. Previously offered as PLP 5043.  
**Credit hours:** 3  
**Contact hours:** Lecture: 2 Lab: 2 Contact: 4  
**Levels:** Graduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Entomology & Plant Pathology
PLP 5413 Plant Disease Epidemiology  
**Prerequisites:** PLP 3343 or PLP 5043.  
**Description:** Introduction to methodology and technical equipment used in epidemiological research and application of epidemiological principles in plant disease control.  
**Credit hours:** 3  
**Contact hours:** Lecture: 3  
**Levels:** Graduate  
**Schedule types:** Lecture  
**Department/School:** Entomology & Plant Pathology

PLP 5523 Integrated Management of Insect Pests and Pathogens  
**Prerequisites:** ENTO 2993 and PLP 3344.  
**Description:** Modern theory and practices for management of insect pests and pathogens in plant production systems, emphasizing an ecologically-based, integrated approach. Basic concepts of pest management, decision-making, cost/benefit analysis and risk/benefit analysis. Previously offered as PLP 5524. Same course as ENTO 5523.  
**Credit hours:** 3  
**Contact hours:** Lecture: 2  
**Levels:** Graduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Entomol & Plant Path

PLP 5560 Problems in Plant Pathology  
**Prerequisites:** Consent of instructor.  
**Description:** Offered for variable credit, 1-5 credit hours, maximum of 10 credit hours.  
**Credit hours:** 1-5  
**Contact hours:** Contact: 1-5  
**Levels:** Graduate  
**Schedule types:** Independent Study  
**Department/School:** Entomology & Plant Pathology

PLP 5613 Host Plant Resistance  
**Prerequisites:** ENTO 3343 and ENTO 2993 or equivalent and a general genetics course; or consent of instructor.  
**Description:** Interactions of plants and the herbivorous insects and pathogenic micro-organisms that attack them. Development and deployment of multiple-pest resistant cultivars in crop management systems. Same course as ENTO 5613.  
**Credit hours:** 3  
**Contact hours:** Lecture: 2  
**Levels:** Graduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Entomology & Plant Pathology

PLP 5623 Advanced Biotechnology Methods  
**Prerequisites:** BIOC 3653, BIOL 3023 or equivalent or consent of instructor.  
**Description:** Principles of biotechnology and laboratory experience with basic techniques used in biochemical and molecular biological research. Same course as ENTO 5623. Previously offered as FOR 5623.  
**Credit hours:** 3  
**Contact hours:** Lecture: 1  
**Levels:** Graduate  
**Schedule types:** Lab, Lecture, Combined lecture and lab  
**Department/School:** Entomology & Plant Pathology

PLP 5700 Teaching Practicum in Plant Pathology  
**Prerequisites:** Graduate student standing.  
**Description:** Variable credit offering for graduate students who wish to develop skills in teaching, assessment and course development working in conjunction with a primary instructor. Offered for variable credit, 1-6 credit hours, maximum of 6 credit hours.  
**Credit hours:** 1-6  
**Contact hours:** Contact: 1-6  
**Levels:** Graduate  
**Schedule types:** Lecture  
**Department/School:** Entomology & Plant Pathology

PLP 5723 Molecular Plant-Microbe Interactions  
**Prerequisites:** PLP 3343 and BIOC 3653.  
**Description:** This course covers the biochemistry, molecular biology and molecular genetics of pathogenic and symbiotic interactions between microbes and plants to explain the mechanisms by which microbe’s infection and activation of plant immunity and symbiosis signaling pathways. Same course as BIOC 6663.  
**Credit hours:** 3  
**Contact hours:** Lecture: 3  
**Levels:** Graduate  
**Schedule types:** Discussion  
**Department/School:** Entomology & Plant Pathology

PLP 5860 Colloquium  
**Prerequisites:** PLP 3343.  
**Description:** This course is designed to provide opportunities for students to gain knowledge about the variety of career opportunities within our field. May not be used for degree credit with PLP 4923.  
**Credit hours:** 2  
**Contact hours:** Contact: 3  
**Levels:** Graduate  
**Schedule types:** Independent Study  
**Department/School:** Entomology & Plant Pathology

PLP 5870 Scientific Presentations  
**Prerequisites:** Consent of instructor.  
**Description:** Preparation and delivery of scientific presentations, including 50-minute seminars, 10-minute talks, and posters. Same course as ENTO 5870. Offered for 1 credit, max 5 credit hours.  
**Credit hours:** 1  
**Contact hours:** Contact: 1  
**Levels:** Graduate  
**Schedule types:** Independent Study  
**Department/School:** Entomology & Plant Pathology

PLP 5923 Applications of Biotechnology in Pest Management  
**Prerequisites:** BIOL 1114 or (BIOL 1113 and BIOL 1111) and CHEM 1215 or equivalents.  
**Description:** Applications of biotechnology in managing arthropod pests of plants, animals, plant pathogens, and weeds. Introduction to underlying technology, products being developed and deployed, effectiveness and associated problems or concerns resulting from their use. May not be used for degree credit with PLP 4923.  
**Credit hours:** 3  
**Contact hours:** Lecture: 3  
**Levels:** Graduate  
**Schedule types:** Lecture  
**Department/School:** Entomology & Plant Pathology
PLP 5992 Career Skills and Professionalism for Scientists
Prerequisites: Graduate standing.
Description: For graduate students majoring in science-based fields, especially those nearing graduation. Skills needed for effective job application and interviewing, career development and advancement, communication with professional colleagues and the public, and personal professional development. Same course as ENTO 5992.
Credit hours: 2
Contact hours: Lecture: 2 Contact: 2
Levels: Graduate
Schedule types: Lecture
Department/School: Entomology & Plant Pathology

PLP 6000 Research
Description: Research for the PhD degree. Offered for variable credit, 1-12 credit hours, maximum of 36 credit hours.
Credit hours: 1-12
Contact hours: Contact: 1-12 Other: 1-12
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomology & Plant Pathology

PLP 6303 Soilborne Diseases of Plants
Prerequisites: PLP 3343.
Description: Soilborne diseases, their reception and importance, the pathogens involved, rhizoplane and rhizosphere influences, inoculum potential, specialization of pathogens, suppressive soil effects, and disease management. Lecture and discussion sessions will emphasize in-depth understanding of problems and complexities associated with studies of soilborne pathogens.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2 Contact: 4
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomology & Plant Pathology

Undergraduate Programs
- Entomology: Bio-Forensics, BSAG (http://catalog.okstate.edu/ferguson-college-agriculture/entomology-plant-pathology/bio-forensics-bsag/)
- Entomology: Pre-Veterinary and Pre-Medical, BSAG (http://catalog.okstate.edu/ferguson-college-agriculture/entomology-plant-pathology/pre-veterinary-pre-medical-bsag/)

Graduate Programs
Advanced Degree Programs
The Department of Entomology and Plant Pathology offers programs of study that lead to the MS of Entomology and Plant Pathology, the PhD in Entomology or the PhD in Plant Pathology. These programs offer students opportunities to specialize in a wide range of basic or applied research fields. To qualify for graduate study in entomology and/or plant pathology an applicant should obtain a solid background in the basic sciences, especially biology, chemistry, mathematics, English, and communications skills. All requirements of the Graduate College must be satisfied for entry to the graduate programs. In addition, applicants for graduate programs should take the Graduate Record Examination and submit their scores. Students applying to the graduate program must be accepted into a research program by a major professor. The applicant must secure appropriate financial support in the form of a scholarship, fellowship or graduate assistantship to be negotiated with the major professor and department and be approved by the departmental screening committee and department head before being admitted to the Department. Each graduate student is under the direction of the major professor as advisor and a selected faculty advisory committee. The program of study is adapted to the individual's needs within departmental and Graduate College guidelines. Graduate students are required to meet with their advisory committees every six months for program reports. Each student will follow a program of study and research approved by the student's committee and, must submit an approved thesis or dissertation, and present a public defense. Students supported as half-time research assistants are expected to be active participants in the research projects of their major professors. Additional information regarding the graduate programs in Entomology and Plant Pathology may be obtained from the department's website at: www.entoplpp.okstate.edu

Minors
- Entomology (ENTO), Minor (http://catalog.okstate.edu/ferguson-college-agriculture/entomology-plant-pathology/entomology-minor/)
- Pest Management (PEST), Minor (http://catalog.okstate.edu/ferguson-college-agriculture/entomology-plant-pathology/pest-management-minor/)

Faculty
Justin Talley, PhD—Professor and Head
Director, Institute of Biosecurity and Microbial Forensics: Kitty Cardwell, PhD

Regents Professors: Kristopher L. Giles, PhD; Haobo Jiang, PhD

Regents Professor Emerita: Jacqueline Fletcher, PhD

Endowed Professor Structural and Urban Entomology: Bradford M. Kard, PhD

Professors: Francisco Ochoa Corona, PhD; Li Maria Ma, PhD; George Opit, PhD; Eric Rebek, PhD; Tom Royer, PhD; Nathan Walker, PhD

Professors Emeriti: Robert W. Barker, PhD; Carol Bender, PhD; Richard C. Berberet, PhD; Jim T. Criswell, PhD; Kenneth Conway, PhD; John P. Damicone, PhD; Jack W. Dillworth, PhD; Jonathon Edelson, PhD; Robert M. Hunger, PhD; Phillip G. Mulder, Jr, PhD; John R. Sauer, PhD; Astrid Wayadande, PhD; Russell E. Wright, PhD

Adjunct Professors: Charles Abramson, PhD; Akhtar Ali, PhD; J. Scott Armstrong, PhD; Kristen Baum, PhD; Norman C. Elliott, PhD; John Foster, PhD; Carla Garzon, PhD; Hassan A. Melouk, PhD; J.P. Michaud, PhD; Richard Nelson, PhD; Hal Reed, PhD; Kiran Mysore, PhD; Carolyn Young, PhD

Associate Professors: W. Wyatt Hoback, PhD; Stephen Marek, PhD; Bruce Noden, PhD

Adjunct Associate Professors: Carmen Greenwood, PhD; Brian McCormack, PhD; Jen White, PhD

Assistant Professors: Meriem Aoun, PhD

Adjunct Assistant Professors: Francisco Flores, PhD; Deborah Jaworski, PhD; Michael Reiskind, PhD; Kay Scheets, PhD

Research Assistant Professor: Andres Espindola Camacho, PhD

Research Associate Professor: Ali Zarrabi, PhD

Associate Extension Specialist & Pesticide Coordinator: Kevin Shelton, MS

Associate Extension Specialists: Steven Kelly Seuhs, MS; Andrine Shufman, PhD

Director, Associate Extension Specialist-Plant Disease Diagnostics: Jen Olson, MS
Director, Oklahoma Agricultural Leadership Program and Associate Extension Specialist (Stored Products): Edmond Bonjour, MS