ENTOMOLOGY AND PLANT PATHOLOGY

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 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 will be 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 2003 Insects and Society (N)
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Entomol & Plant Path
General Education and other Course Attributes: Natural Sciences

ENTO 2143 Global Issues in Agricultural Biosecurity and Forensics
Description: Biosecurity, biosafety, bioterrorism, microbial forensics, emerging organisms, invasive species, quarantine, response, surveillance, detection, diagnostics, and how all system components integrate to science, and to agricultural specialties, economics and defense. Same course as PLP 2143.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Entomol & Plant Path

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
Levels: Undergraduate
Schedule types: Lecture
Department/School: Entomol & Plant Path
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
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path
General Education and other Course Attributes: Scientific Investigation, Natural Sciences
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
<th>Prerequisites</th>
<th>Credit hours</th>
<th>Contact hours</th>
<th>Levels</th>
<th>Schedule types</th>
<th>Department/School</th>
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<tbody>
<tr>
<td>ENTO 3003</td>
<td>Livestock Entomology</td>
<td>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.</td>
<td></td>
<td>3</td>
<td>Lab: 3</td>
<td>Undergraduate</td>
<td>Lecture</td>
<td>Entomol &amp; Plant Path</td>
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<tr>
<td>ENTO 3021</td>
<td>Postharvest, Structural, and Urban Arthropod Pests</td>
<td>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.</td>
<td>ENTO 2993</td>
<td>1</td>
<td>Lab: 2</td>
<td>Undergraduate</td>
<td>Lab</td>
<td>Entomol &amp; Plant Path</td>
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<tr>
<td>ENTO 3044</td>
<td>Insect Morphology and Physiology</td>
<td>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.</td>
<td>ENTO 2993 Introduction to Entomology</td>
<td>4</td>
<td>Lecture: 3 Lab: 3</td>
<td>Undergraduate</td>
<td>Lab, Lecture, Combined lecture and lab</td>
<td>Entomol &amp; Plant Path</td>
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<tr>
<td>ENTO 3331</td>
<td>Insect Pests of Agronomic Crops</td>
<td>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.</td>
<td>ENTO 2993 or concurrent enrollment.</td>
<td>1</td>
<td>Lab: 2</td>
<td>Undergraduate</td>
<td>Lab</td>
<td>Entomol &amp; Plant Path</td>
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<tr>
<td>ENTO 3421</td>
<td>Horticultural Insects</td>
<td>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.</td>
<td></td>
<td>1</td>
<td>Lab: 2</td>
<td>Undergraduate</td>
<td>Lab</td>
<td>Entomol &amp; Plant Path</td>
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<tr>
<td>ENTO 3461</td>
<td>Insects in Forest Ecosystems</td>
<td>Identification and seasonal life history of insect pests and beneficial insects on shade trees in urban settings, in commercial forests, and in forest products.</td>
<td>ENTO 2993 or concurrent enrollment.</td>
<td>1</td>
<td>Lab: 2</td>
<td>Undergraduate</td>
<td>Lab, Lecture</td>
<td>Entomol &amp; Plant Path</td>
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<tr>
<td>ENTO 3501</td>
<td>Entomology for Educators</td>
<td>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.</td>
<td>ENTO 2993 or equivalent.</td>
<td>1</td>
<td>Lab: 2</td>
<td>Undergraduate</td>
<td>Lab, Lecture, Combined lecture and lab</td>
<td>Entomol &amp; Plant Path</td>
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<tr>
<td>ENTO 3644</td>
<td>Insect Morphology</td>
<td>Insect development and comparative morphology. Offered in combination with 5644. No credit for both ENTO 3644 and ENTO 5644.</td>
<td>ENTO 2993 or equivalent.</td>
<td>4</td>
<td>Lecture: 2 Lab: 4</td>
<td>Undergraduate</td>
<td>Lab, Lecture, Combined lecture and lab</td>
<td>Entomol &amp; Plant Path</td>
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<tr>
<td>ENTO 3663</td>
<td>Turfgrass Integrated Pest Management</td>
<td>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.</td>
<td>PLP 3343 or ENTO 2993.</td>
<td>3</td>
<td>Lab: 2</td>
<td>Undergraduate</td>
<td>Lab, Lecture, Combined lecture and lab</td>
<td>Entomol &amp; Plant Path</td>
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<tr>
<td>ENTO 4223</td>
<td>Ecological Methodology</td>
<td>One course in either ecology or general biology. 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.</td>
<td></td>
<td>3</td>
<td>Lecture: 2 Lab: 2</td>
<td>Undergraduate</td>
<td>Lab, Lecture, Combined lecture and lab</td>
<td>Entomol &amp; Plant Path</td>
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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: Other: 1
Levels: Undergraduate
Schedule types: Independent Study
Department/School: Entomol & Plant Path

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
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

ENTO 4484 Aquatic Entomology
Prerequisites: ENTO 2993 or ZOOL 1604 or consent of instructor.
Description: Biology, taxonomy and ecology of insects and other invertebrates, inhabiting freshwater environments. Emphasis is placed on identification biology of individual taxa. Roles of insects in aquatic ecology as a forage base, and as indicators of biotic integrity of aquatic systems. Linkages between aquatic systems and terrestrial systems are also examined. No credit for students with credit in ENTO 5484 or ZOOL 5484. Same course as ZOOL 4484. Previously offered as ENTO 4483.
Credit hours: 4
Contact hours: Lecture: 2 Lab: 4
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

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
Levels: Undergraduate
Schedule types: Lecture
Department/School: Entomol & Plant Path

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
Levels: Undergraduate
Schedule types: Lecture
Department/School: Entomol & Plant Path

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
Levels: Undergraduate
Schedule types: Lecture
Department/School: Entomol & Plant Path

ENTO 4800 Entomology Practicum
Prerequisites: Consent of practicum coordinator and adviser.
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, 1-6 credit hours, maximum of 6 credit hours.
Credit hours: 1-6
Contact hours: Other: 1
Levels: Undergraduate
Schedule types: Independent Study
Department/School: Entomol & Plant Path

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
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

ENTO 4923 Applications of Biotechnology in Pest Management
Prerequisites: BIOL 1114 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.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate, Undergraduate
Schedule types: Lecture
Department/School: Entomol & Plant Path

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: Other: 1
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomol & Plant Path

ENTO 5003 Insect Biochemistry
Prerequisites: Consent of instructor.
Description: Biochemical processes in insects and closely related arthropods with emphasis on metabolic pathways unique to this group. Biochemical aspects of arthropod host interactions.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Entomol & Plant Path
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: Other: 1
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomol & Plant Path

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
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

ENTO 5046 Insect Biology and Classification
Prerequisites: ENTO 2993 or equivalent or consent of instructor.
Description: Insect phylogeny, 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
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

ENTO 5050 Special Problems
Prerequisites: ENTO 2993 or equivalent or consent of instructor.
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: Other: 1
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomol & Plant Path

ENTO 5051 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
Levels: Graduate
Schedule types: Lab
Department/School: Entomol & Plant Path

ENTO 5052 Integrated Management of Insect Pests and Pathogens
Prerequisites: ENTO 2993 and PLP 3344 or equivalent or consent of instructor.
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. Same course as PLP 5524. Previously offered as ENTO 5523.
Credit hours: 4
Contact hours: Lecture: 2 Lab: 4
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

ENTO 5053 Introduction to Forensic 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: Other: 1
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomol & Plant Path

ENTO 5054 Aquatic Entomology
Prerequisites: ENTO 2993 or ZOOL 1604 or consent of instructor.
Description: Biology, taxonomy and ecology of insects and other invertebrates, inhabiting freshwater environments. Emphasis is placed on 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. Graduate students will have extra collection requirements and biotic integrity analyses. No credit for students with credit in ZOOL 5484, ENTO 4484 or ZOOL 4484. Same course as ZOOL 5484. Previously offered as ENTO 5483.
Credit hours: 4
Contact hours: Lecture: 2 Lab: 4
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

ENTO 5055 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: Other: 1
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomol & Plant Path

ENTO 5056 Integrated Pest Management
Prerequisites: ENTO 2993 or equivalent or consent of instructor.
Description: The ecological principles and applied practices of biological control of insects, weeds and plant pathogens. Epizootiology including the scientific basis of biological control; natural enemies and their biology; biological control methods; and biological control in integrated pest management programs. Previously offered as ENTO 5512.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

ENTO 5057 Entomology and Plant Pathology
Prerequisites: ENTO 2993 or equivalent or consent of instructor.
Description: The ecological principles and applied practices of biological control of insects, weeds and plant pathogens. Epizootiology including the scientific basis of biological control; natural enemies and their biology; biological control methods; and biological control in integrated pest management programs. Previously offered as ENTO 5512.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

ENTO 5058 Biological Control
Prerequisites: ENTO 2993 or equivalent or consent of instructor.
Description: The ecological principles and applied practices of biological control of insects, weeds and plant pathogens. Epizootiology including the scientific basis of biological control; natural enemies and their biology; biological control methods; and biological control in integrated pest management programs. Previously offered as ENTO 5512.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path
ENTO 5623 Advanced Biotechnology Methods  
**Prerequisites:** BIOD 3653, BIOL 3023 or equivalent or consent of instructor.  
**Description:** Overview of current theory and principles of biotechnology and laboratory experience with contemporary techniques and experimental methods used in biotechnology, including genome analysis, gene transfer, identification and isolation of genes and their products and regulation of gene expression in plants and arthropods. Same course as PLP 5623.  
**Credit hours:** 3  
**Contact hours:** Lecture: 1 Lab: 4  
**Levels:** Graduate  
**Department/School:** Entomol & Plant Path

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  
**Levels:** Graduate  
**Department/School:** Entomol & Plant Path

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 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:** Other: 1  
**Levels:** Graduate  
**Department/School:** Entomol & Plant Path

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:** Other: 1  
**Levels:** Graduate  
**Department/School:** Entomol & Plant Path

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  
**Levels:** Graduate  
**Department/School:** Entomol & Plant Path

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  
**Levels:** Graduate  
**Department/School:** Entomol & Plant Path

ENTO 5833 Insect Molecular Biology  
**Prerequisites:** ENTO 2993 and BIOL 3024 or equivalent or consent of instructor.  
**Description:** Concepts and methods in molecular biology with emphasis on genetics of insects. Application of molecular techniques in insect biology.  
**Credit hours:** 3  
**Contact hours:** Lecture: 3  
**Levels:** Graduate  
**Department/School:** Entomol & Plant Path

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:** Other: 1  
**Levels:** Graduate  
**Department/School:** Entomol & Plant Path

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:** Other: 1  
**Levels:** Graduate  
**Department/School:** Entomol & Plant Path

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  
**Levels:** Graduate  
**Department/School:** Entomol & Plant Path
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: Other: 1
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomol & Plant Path

ENTO 6100 Advanced Insect Physiology
Prerequisites: ENTO 3044 or ENTO 5044 or equivalent.
Description: Special problems in advanced insect physiology. Offered for variable credit, 1-5 credit hours, maximum of 5 credit hours.
Credit hours: 1-5
Contact hours: Other: 1
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomol & Plant Path

PLP 2143 Global Issues in Agricultural Biosecurity and Forensics
Description: Biosecurity, biosafety, bioterrorism, microbial forensics, emerging organisms, invasive species, quarantine, response, surveillance, detection, diagnostics, and how all system components integrate to science and to agricultural specialties, economics and defense. Same course as ENTO 2143.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Entomol & Plant Path

PLP 3343 Principles of Plant Pathology
Prerequisites: BOT 1404 or BOT 3463 or MICR 2125 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, 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 3343.
Credit hours: 3
Contact hours: Lecture: 2 Lab: 2
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

PLP 3553 Fungi: Myths and More
Prerequisites: BIOL 1114 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
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

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
Levels: Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

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: Other: 1
Levels: Undergraduate
Schedule types: Independent Study
Department/School: Entomol & Plant Path

PLP 4922 Applications of Biotechnology in Pest Management
Prerequisites: BIOL 1114 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.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate, Undergraduate
Schedule types: Lecture
Department/School: Entomol & Plant Path

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: Other: 1
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomol & Plant Path

PLP 5003 Plant Nematology
Prerequisites: PLP 3343 or concurrent enrollment.
Description: General morphology, taxonomy and bionomics 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
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

PLP 5014 Plant Virology
Credit hours: 4
Contact hours: Lecture: 3 Lab: 2
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path
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
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

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

PLP 5343 Principles of Plant Pathology
Prerequisites: BOT 1404 or BOT 3463 or MICR 2125 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
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

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: Entomol & Plant Path

PLP 5524 Integrated Management of Insect Pests and Pathogens
Prerequisites: PLP 3343, ENTO 2993 or equivalent or consent of instructor.
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. Same course as ENTO 5524. Previously offered as PLP 5523.
Credit hours: 4
Contact hours: Lecture: 2 Lab: 4
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: Other: 1
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomol & Plant Path

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 Lab: 2
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

PLP 5623 Advanced Biotechnology Methods
Prerequisites: BIOC 3653, BIOL 3023 or equivalent or consent of instructor.
Description: Overview of current theory and principles of biotechnology and laboratory experience with contemporary techniques and experimental methods used in biotechnology, including genome analysis, gene transfer, identification and isolation of genes and their products, and regulation of gene expression in plants and arthropods. Same course as ENTO 5623. Previously offered as FOR 5623.
Credit hours: 3
Contact hours: Lecture: 1 Lab: 4
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

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: Other: 1
Levels: Graduate
Schedule types: Discussion
Department/School: Entomol & Plant Path

PLP 5724 Physiology of Host-Pathogen Interactions
Prerequisites: PLP 3343 and BIOC 3653.
Description: Physiology of the interactions between plants and pathogens. Mechanisms by which pathogens infect and by which plants resist infection.
Credit hours: 4
Contact hours: Lecture: 4 Lab: 0
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path
PLP 5860 Colloquium
Prerequisites: PLP 3343.
Description: Concepts and principles of plant pathology through discussions of pertinent literature. Offered for 2 credits, max 2 credit hours.
Credit hours: 2
Contact hours: Other: 1
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomol & Plant Path
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: Other: 1
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomol & Plant Path
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
Levels: Graduate
Schedule types: Lecture
Department/School: Entomol & Plant Path
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: Other: 1
Levels: Graduate
Schedule types: Independent Study
Department/School: Entomol & Plant Path
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
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Entomol & Plant Path

Undergraduate Programs
- Entomology: Pre-Veterinary and Pre-Medical, BSAG (http://catalog.okstate.edu/agricultural-sciences-natural-resources/entomology-plant-pathology/pre-veterinary-pre-medical-bsag)
- Entomology (ENTO), Minor (http://catalog.okstate.edu/agricultural-sciences-natural-resources/entomology-plant-pathology/entomology-minor)
- Pest Management (PEST), Minor (http://catalog.okstate.edu/agricultural-sciences-natural-resources/entomology-plant-pathology/pest-management-minor)

Graduate 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 adviser and a selected faculty advisory committee. The program of study will be 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 and examinations. 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.entoplp.okstate.edu (http://www.entopolp.okstate.edu).

Faculty
Phillip G. Mulder, Jr., PhD—Professor and Head
Director, National Institute for Microbial Forensics and Food & Agricultural Biosecurity (NIMFFAB): Kitty Cardwell, PhD
Regents Professors: Kristopher L. Giles, PhD; Haobo Jiang, PhD
Regents Professor Emeritus: Jacqueline Fletcher, PhD
Endowed Professor Structural and Urban Entomology: Bradford M. Kard, PhD
Professors: John P. Damicone, PhD; Robert M. Hunger, PhD; Eric Rebek, PhD; Tom A. Royer, PhD; Justin Talley, PhD; Nathan Walker, PhD; Astri Wayadande, PhD
Professors Emeriti: Robert W. Barker, PhD; Carol Bender, PhD; Richard C. Berberet, PhD; Jim T. Criswell, PhD; Kenneth Conway, PhD; Jack W. Dillwitt, PhD; Jonathon Edelson, PhD; Larry J. Littlefield, PhD; John R. Sauer, PhD; Russell E. Wright, PhD
Adjunct Professors: Charles Abramson, PhD; J. Scott Armstrong, PhD; Kristen Baum, PhD; Norman C. Elliott, PhD; John Foster, PhD; Hassan A. Melouk, PhD; Richard Nelson, PhD; Gary Puterka, PhD; Hal Reed, PhD
Associate Professors: Carla Garzon, PhD; Li Maria Ma, PhD; Stephen Marek, PhD; Francisco Ochoa Corona, PhD; George Opit, PhD
Adjunct Associate Professors: Carmen Greenwood, PhD; J.P. Michaud, PhD; Brian McCornack, PhD; Kiran Mysore, PhD; Carolyn Young, PhD
Assistant Professors: W. Wyatt Hoback, PhD; Bruce Noden, PhD
Adjunct Assistant Professors: Francisco Flores, PhD; Steven Frank, PhD; Deborah Jaworski, PhD; Jacquelyn Lee, PhD; Michael Reiskind, PhD; Kay Scheets, PhD; Damon Smith, PhD
Research Associate Professor: Ali Zarrabi, PhD
Research Associate Professor: Trenna Blagden, PhD
Associate Extension Specialist: Andrine Shufran, PhD
Associate Extension Specialist & Pesticide Coordinator: Kevin Shelton, MS
Associate Extension Specialist: Steven Kelly Seuhs, MS
Director, Associate Extension Specialist-Plant Disease Diagnostics: Jen Olson, MS
Director, Oklahoma Agricultural Leadership Program and Extension Associate (Stored Products): Edmond Bonjour, MS