ENTOMOLOGY, PLANT PATHOLOGY AND WEED SCIENCE

Undergraduate Program Information

Specific courses that meet these and the university general education requirements and additional courses in biology, chemistry, mathematics and seminar are included below in departmental requirements. A total of 120 credits are required for graduation. At least 48 credits must be 300-level courses and above. Schedules in specific semesters will be developed with the help of a student's academic advisor.

Graduate Program Information

The complexity of managing insects, plant diseases, and weeds is increasing environmental concerns, costs, and regulations requiring an integrated approach to management strategies. Future professionals in integrated pest management will be ecologically oriented, trained to manipulate biological and cultural technologies while minimizing chemical control options. The Master of Science degree program in agricultural biology is designed to produce graduates with the academic and research background needed to facilitate effective, innovative, and environmentally sound protection of plants and animals from a wide and varied spectrum of pests. Students will be prepared for careers in research, extension, teaching, private consulting, industry, and government or to continue in a broad range of Ph.D. programs. Specific opportunities will include positions as agricultural consultants, technical and sales representatives for industry, state departments of agriculture and USDA specialists, agricultural extension agents, and industry research and environmental technicians. There is currently a strong need for MS graduates trained in these areas, and the demand is expected to increase dramatically.

Students may wish to concentrate their graduate program in entomology, plant pathology, or weed science, or conversely may wish to be broadly trained in all three pest-management disciplines. Most students will be expected to complete a thesis. A non-thesis option is available, depending on prior training and experience and subject to approval by the department head. A nonthesis research option requires completion of a research paper, suitable as judged by the student's graduate committee, for journal publication. Completion of an undergraduate degree essentially equivalent to that offered by the department is required for admission to the MS graduate program. Qualifications for admission will be reviewed by the departmental Graduate Admissions committee. Prospective graduate students must have at least a 3.0 undergraduate GPA, complete the GRE, and submit an official transcript, a letter of intent and three letters of recommendation.

Degrees for the Department

Bachelor Degree(s)

- Applied and Agricultural Biology (Applied Biology) - Bachelor of Science in Agriculture (https://catalogs.nmsu.edu/nmsu/agricultural-consumer-environmental-sciences/entomology-science/agricultural-biology-applied-biology-bachelor-science-agriculture/)
- Applied and Agricultural Biology (Applied Microbiology) - Bachelor of Science in Agriculture (https://catalogs.nmsu.edu/nmsu/agricultural-consumer-environmental-sciences/entomology-science/agricultural-biology-applied-microbiology-bachelor-science-agriculture/)
- Applied and Agricultural Biology (Entomology) - Bachelor of Science in Agriculture (https://catalogs.nmsu.edu/nmsu/agricultural-consumer-environmental-sciences/entomology-science/agricultural-biology-entomology-bachelor-science-agriculture/)
- Applied and Agricultural Biology (Environmental Biology) - Bachelor of Science in Agriculture (https://catalogs.nmsu.edu/nmsu/agricultural-consumer-environmental-sciences/entomology-science/agricultural-biology-environmental-biology-bachelor-science-agriculture/)
- Applied and Agricultural Biology (Invasive Pest Biology and Management) - Bachelor of Science in Agriculture (https://catalogs.nmsu.edu/nmsu/agricultural-consumer-environmental-sciences/entomology-science/agricultural-biology-pest-biology-management-bachelor-science-agriculture/)
- General Agriculture - Bachelor of Science in Agriculture (https://catalogs.nmsu.edu/nmsu/agricultural-consumer-environmental-sciences/entomology-science/general-agriculture-bsag/)

Master Degree(s)

- Applied and Agricultural Biology - Master of Science (https://catalogs.nmsu.edu/nmsu/graduate-school/agricultural-biology-master-science/)

Doctoral Degree(s)

- Applied and Agricultural Biology - Doctor of Philosophy (https://catalogs.nmsu.edu/nmsu/graduate-school/applied-agricultural-biology-doctor-philosophy/)

Minors for the Department

- Entomology - Undergraduate Minor (https://catalogs.nmsu.edu/nmsu/agricultural-consumer-environmental-sciences/entomology-science/entomology-undergraduate-minor/)
- Pest Management - Undergraduate Minor (https://catalogs.nmsu.edu/nmsu/agricultural-consumer-environmental-sciences/entomology-science/pest-management-undergraduate-minor/)
- Plant Pathology - Undergraduate Minor (https://catalogs.nmsu.edu/nmsu/agricultural-consumer-environmental-sciences/entomology-science/plant-pathology-undergraduate-minor/)
- Weed Science - Undergraduate Minor (https://catalogs.nmsu.edu/nmsu/agricultural-consumer-environmental-sciences/entomology-science/weed-science-undergraduate-minor/)

Professor, Ricardo Ramirez, Department Head

Professors Bundy, Creamer, Randall, Sanogo; ***Associate Professors*** Beck, Hanson, Lehnhoff, Mesbah, Pierce, Schutte; ***Assistant Professor*** Bloese, Bowers, Hubbard, King; Affiliated Faculty Bleiweiss, De Ley;

R. Ramirez, Department Head, Ph.D. (Washington State)– Entomology; L. Beck, Ph.D. (Texas Tech)- Weed Specialist; J. Bloese, Ph.D. (California-Davis) - Small Farms IPM Specialist; K. Bowers, Ph.D. (University of Florida)-Entomology; C. S. Bundy, Ph.D. (Georgia)– Entomology; R. Creamer, Ph.D. (California-Davis)– Plant Pathology; S. Hanson, Ph.D. (University of Wisconsin)– Molecular Plant Pathology; C. Hubbard, Ph.D. (California-Riverside) - Urban Entomology; E. Lehnhoff, Ph.D. (Montana State) Ecology and Environmental Science; J. Breen Pierce (Rutgers)– Entomology; J. Randall, Ph.D. (New Mexico State University)-Plant Pathology; S. Sanogo, Ph.D. (Pennsylvania State)– Plant Pathology; B. Schutte, Ph.D. (Ohio State)– Horticulture & Crop Science.

Entomology, Plant Pathology and Weed Science Courses

EPWS 1110G. Applied Biology
3 Credits (3)
Introduction to applied biology and ecology focusing on insects, plants and pathogens in natural areas, crops and urban settings. EPWS 1110L is strongly recommended to take in the same semester. May be repeated up to 3 credits.

Learning Outcomes

1. Students will learn about the Department of Entomology Plant Pathology and Weed Science and will have the opportunity to meet the Las Cruces-based faculty in the department.
2. By the end of this course students will have gained a broad understanding of the pests in a wide range of systems, their interactions with other organisms, and the methods available to minimize the influence of pests on target commodities.

EPWS 1110L. Applied Biology Lab
1 Credit (1)
Study of applied biology and ecology of insects, plants and pathogens in natural areas, crops, and urban settings. EPWS 1110 strongly recommended to take in the same semester. May be repeated up to 1 credits. Restricted to Las Cruces campus only.

Learning Outcomes

1. Students will learn about the Department of Entomology Plant Pathology and Weed Science and will have the opportunity to meet the Las Cruces-based faculty in the department.
2. By the end of this course students will have gained a broad understanding of the pests in a wide range of systems, their interactions with other organisms, and the methods available to minimize the influence of pests on target commodities.

EPWS 2996. Special Topics
1-4 Credits
Specific subjects and credits to be announced in the Schedule of Classes. Maximum of 4 credits per semester and a grand total of 9 credits.

Learning Outcomes

1. Varies

EPWS 300. Special Topics
1-4 Credits
Specific topics and credits to be announced in the Schedule of Classes. Maximum of 4 credits per semester and a grand total of 9 credits.

EPWS 301. Agricultural Biotechnology
3 Credits (2+2P)
The principles of molecular biology will be introduced and used to explore the past, present, and future applications of biotechnology in agriculture. Specific topics include methodologies for making transgenic plants with increased pest resistance, the use of biotechnology in pest detection, and improving nutritional value. The laboratory will provide students with hands-on experience with equipment used for biotechnology research.
Prerequisites: CHEM 1225G, BIOL 2610G, or BIOL 2110G.

EPWS 302. General Entomology
4 Credits (4)
An introduction to the biology and classification of insects. Lecture covers life histories, classification, ecology and behavior of insect orders and families. Laboratory focuses on identification of insect orders and families. May be repeated up to 4 credits.
Prerequisite: BIOL 2610G, or BIOL 2110G.

Learning Outcomes

1. Have a detailed understanding of the biology and taxonomy of insects.
2. Be able to identify all insect orders.
3. Be able to sight identify common families of North American Insects.
4. Be able to properly curate insect specimens.

EPWS 302 H. General Entomology Honors
4 Credits (4)
An introduction to the biology and classification of insects. Lecture covers life histories, classification, ecology and behavior of insects orders and families. Laboratory focuses on identification of insect orders and families. Students in the Honors section will be given the opportunity to enhance their understanding of entomology with a more detailed examination into the lives of these fascinating organisms.
Prerequisite: BIOL 2610G, or BIOL 2110G.

Learning Outcomes

1. Have a detailed understanding of the biology and taxonomy of insects.
2. Be able to identify all insect orders.
3. Be able to sight identify common families of North American Insects.
4. Be able to properly curate insect specimens.

EPWS 303. Economic Entomology
3 Credits (3+2P)
Identification and life cycles of insects of economic significance, their relationship to humans and agriculture including biological interactions and controls. May be repeated up to 3 credits.
Prerequisite: BIOL 2610G, or BIOL 2110G.

Learning Outcomes

1. Know the names and functions of insect arthropod organs and how these organisms sense the environment and maintain homeostasis within their environment.
2. Understand the importance of naming and classifying insects and be able to name the important orders and families of pest and beneficial insects.
3. Define what a pest arthropod and how to establish economic thresholds for pests.
4. Understand pest management theory and tactics and be able to describe including pest management with natural enemies, environmental manipulation, insecticides, biopesticides, sterile insect technique and others.

EPWS 310. Plant Pathology
4 Credits (3+2P)
Causes and methods of prevention and treatment of diseases in plants.
Prerequisite(s): BIOL 2610G, or BIOL 2110G.

EPWS 310 H. Plant Pathology Honors
4 Credits (4)
Cause and methods of prevention and treatment of diseases in plants. Students with an Honors designation will have additional project and report assignments.
Prerequisite(s): BIOL 2610G, or BIOL 2110G.

EPWS 311. Introduction to Weed Science
4 Credits (3+2P)
Principles of weed science, with emphasis on characteristics of invasive plants, methods of integrated weed management, and current issues impacting weed management. Identification of local weeds. Taught with AGRO 311. May be repeated up to 4 credits.
Prerequisite: CHEM 1215G, and BIOL 2110G.

Learning Outcomes

1. Describe the environmental conditions and inherent traits that promote the growth and persistence of weed populations in managed and natural ecosystems.
2. Predict causes and consequences of weed management failures in agricultural and natural ecosystems.
3. Apply knowledge of herbicidal, mechanical and cultural weed control to develop integrated strategies for weed problems.
4. Classify herbicides based on injury symptoms, mode of action, site of action, translocation, selectivity, potential uses and potential dangers.
5. Identify common weeds found in southern New Mexico by providing correctly spelled botanical and common names, as well as lifecycles.
6. Demonstrate the ability to safely apply herbicide solutions including: perform the activities and calculations to ensure that a sprayer delivers the appropriate amount of solution over the sprayed area, interpret herbicide labels to identify guidelines for safety, dosage and application procedures, and perform the calculations necessary for determining appropriate amounts of herbicide, carrier and adjuvant to add to a spray tank.

EPWS 314. Plant Physiology
3 Credits (3)
Overview of photosynthesis, respiration, water relations of plants, minerals and organic nutrition, growth and development. Same as BIOL 314.
Prerequisite: BIOL 2110G, CHEM 1225G.
Learning Outcomes

1. Summarize the chemical and physical bases for processes in plants involving water relations, metabolism, and growth.
2. Compare and contrast forms of photosynthesis that are adaptive, and not adaptive, to heat and drought.
3. Explain physiological mechanisms supporting plant tolerance to abiotic and biotic stresses.
4. Predict consequences of environmental change on physiological processes and growth of individual plants.
5. Apply course concepts to real-world scenarios that involve plant function and plant development.

EPWS 325V. Insects, Humans, and the Environment
3 Credits (3)
Overview of the interactions of the world's largest group of organisms with humans. Emphasizing the role of insects in the development of human cultures, including health, food and fiber production, art, music, and environmental issues; with discussions of historic, present day, and future impacts in underdeveloped, developing, and developed civilizations.
Learning Outcomes

1. Have an understanding and appreciation of the importance of insects and other arthropods to humans and the natural world.
2. Have a basic understanding of the biology of important insect groups.

EPWS 373. Fungal Biology
3 Credits (2+2P)
Introduction to the taxonomy, morphology, physiology, and ecology of fungi. Same as BIOL 373. May be repeated up to 3 credits.
Prerequisite: EPWS 310 or BIOL 311, or consent of instructor.
Learning Outcomes

1. To describe the importance of fungi in our environment.
2. To explore the morphology and physiology of major groups of fungi.
3. To describe the associations of fungi with humans, animals, and plants.

EPWS 380V. Science & Society
3 Credits (3)
Analysis and evaluation of how human activities affect the earth's environment or ecosystems. Several examples, from global issues to local issues will be studied in detail. Current science and the intersection of science and public policy will be discussed in relation to problems like world population, agricultural productivity, deforestation, medical advances, and future prospects for the environment.
Learning Outcomes

1. Become familiar with current science topics affecting society such as climate change, pandemics, vaccinations and the anti-vaccination movement, food production, and others to be discussed in class.
2. Improve critical thinking skills and become comfortable with evaluating claims using a data and evidence based approaches.
3. Gain an appreciation of how science affects society and how fake science can hurt society.

EPWS 390. Internship
1-3 Credits
Professional work experience under the joint supervision of the employer and a faculty member. A written report is required. Maximum of 3 credits. May be repeated up to 3 credits.
Learning Outcomes

1. Varies.

EPWS 420. Environmental Behavior of Pesticides
3 Credits (3)
Behavior of pesticide compounds in the environment, their function toward target and non target pest organisms including humans, effect of environmental conditions on pesticide function, ecology of organisms involved in pesticides degradation,overview of environmental regulation. CHEM 2115 recommended prior to course. May be repeated up to 3 credits.

EPWS 440. Tropical Insect Ecology
3 Credits (3)
This course is designed to expose students to world of insects and other arthropods living in a variety of tropical environments. We will explore multiple habitats in search of these fascinating organisms. Students will gain valuable experience on the biology, identification, field sampling techniques, and ecology of tropical arthropods. We will examine the biodiversity of these important organisms and gain a better understanding of their diminishing habitats.
Learning Outcomes

1. Students will gain experience in the biology and identification of tropical insects and other arthropods.
2. Students will gain experience in insect biodiversity and proper field sampling techniques in a variety of habitats.
3. Students will gain experience on the issues affecting threatened habitats.

EPWS 447. Seminar
1 Credit (1)
Organization and techniques for the oral presentation of research information. Restricted to: Main campus only.

EPWS 447 H. Seminar Honors
1 Credit (1)
Organization and techniques for the oral presentation of research information. Students taking EPWS 447 H will have the additional

assignment of making a poster on either scientific research or a scientific topic.
Prerequisite(s): Honors eligibility requirements.

EPWS 449. Special Problems
1-3 Credits
Individual investigation in specific areas of entomology, plant pathology or plant physiology. Maximum of 3 credits per semester and a grand total of 6 credits. May be repeated up to 6 credits.
Learning Outcomes
1. Varies.

EPWS 451. Special Topics
1-4 Credits
Specific subjects and credits to be announced in the Schedule of Classes. Maximum of 4 credits per semester and a grand total of 9 credits. May be repeated up to 9 credits.
Learning Outcomes
1. Varies.

EPWS 455. Advanced Integrated Pest Management
3 Credits (3)
Examination of factors affecting the biology and ecology, population evaluations, and control of insect, disease, and weed pests with an emphasis on integrating management practices. Credit cannot be given for both EPWS 455 and EPWS 505. Taught with: EPWS 505.
Prerequisite: Either EPWS 303 or EPWS 310 or EPWS 311, or consent of instructor.
Learning Outcomes
1. Understand the basic tenets of pest management.
2. Classify the different pest groups and their ecology.
3. Comprehend the variety of management strategies.
4. Understand how management effects the ecosystem.
5. Comprehend a systems approach to management.
6. Critically analyze, develop, present, and discuss pest management systems.

EPWS 456. Biological Control
3 Credits (3)
Principles of plant and animal suppression using living organisms. Interaction of biological control organisms with biotic and abiotic factors will be stressed. Credit cannot be given for both EPWS 456 and EPWS 506. Students should complete an introductory course in entomology prior to enrollment.
Learning Outcomes
1. Summarize the basic concepts of biological control of arthropods, weeds, and some pathogens.
2. Explain the benefits, challenges, and risks of biological control technologies.
3. Apply course concepts to real-world scenarios that involve biological control.

EPWS 462. Parasitology
3 Credits (3)
Introduction to classification, biology, ecology and management of the major parasites of human, domestic animals and wildlife.
Learning Outcomes
1. Students will learn about the major parasites of human, domestic animals, and wildlife.
2. Students will learn how to detect, identify, and manage parasites in the above mentioned mediums.

EPWS 471. Plant Mineral Nutrition
3 Credits (3)
Same as HORT 471 and AGRO 471.

EPWS 486. Plant Virology
3 Credits (3)
An overview of viral pathogens associated with infectious plant disease. Includes pathogens, replication, genetics, transmission, and movement of plant viruses.
Learning Outcomes
1. Understand the basic tenets of plant virology.
2. Determine different plant virus groups.
3. Comprehend the variety of genome strategies and organization.
4. Understand viral replication processes.
5. Comprehend transmission and viral ecology/epidemiology.
6. Critically analyze, present, and discuss current journal articles in plant virology.

EPWS 492. Diagnosing Plant Disorders
3 Credits (2+3P)
Systematic diagnosis of the physiological, pathological, and entomological causes of plant disorders. Same as AGRO 492 and HORT 492. May be repeated up to 3 credits.
Prerequisite: EPWS 303, EPWS 310.
Learning Outcomes
1. To describe the major types of plant disorders.
2. To identify the biotic and abiotic agents causing plant disorders.
3. To define the approaches used in diagnosing plant disorders.

EPWS 502. General Entomology
4 Credits (4)
An introduction to the biology and classification of insects. Lecture covers life histories, classification, ecology and behavior of insect orders and families. Laboratory focuses on identification of insect orders and families.
Prerequisite: BIOL 2610G or BIOL 2110G.
Learning Outcomes
1. Have a detailed understanding of the biology and taxonomy of insects.
2. Be able to identify all insect orders.
3. Be able to sight identify common families of North American Insects.
4. Be able to properly curate insect specimens.

EPWS 505. Advanced Integrated Pest Management
3 Credits (3)
Examination of the factors affecting the biology and ecology, population evaluations, and control of insect, disease, and weed pests, with an emphasis on integrating management practices. Crosslisted with: EPWS 455.
Prerequisite(s): EPWS 303 or EPWS 310 or EPWS 311 or consent of instructor.

EPWS 506. Biological Control
3 Credits (3)
Principles of plant and animal pest suppression using living organisms. Interaction of biological control organisms with biotic and abiotic factors will be stressed. Individual paper or project required. An introductory course in entomology should be completed before enrollment. Credit cannot be given for both EPWS 456 and EPWS 506.
Learning Outcomes
1. Summarize the basic concepts of biological control of arthropods, weeds, and some pathogens.

2. Explain the benefits, challenges, and risks of biological control technologies.
3. Apply course concepts to real-world scenarios that involve biological control.

EPWS 511. Introduction to Weed Science (f)
4 Credits (3+2P)
Covers the principles of weed science with emphasis on characteristics of invasive plants, methods of integrated weed management, and current issues impacting weed management. Includes identification of local weeds. Research paper required for graduate credit. Taught with AGRO 511. May be repeated up to 4 credits.
Prerequisite: CHEM 1215G and BIOL 2110G.
Learning Outcomes
1. Describe the environmental conditions and inherent traits that promote the growth and persistence of weed populations in managed and natural ecosystems.
2. Predict causes and consequences of weed management failures in agricultural and natural ecosystems.
3. Apply knowledge of herbicidal, mechanical and cultural weed control to develop integrated strategies for weed problems.
4. Classify herbicides based on injury symptoms, mode of action, site of action, translocation, selectivity, potential uses and potential dangers.
5. Identify common weeds found in southern New Mexico by providing correctly spelled botanical and common names, as well as lifecycles.
6. Demonstrate the ability to safely apply herbicide solutions includes: perform the activities and calculations to ensure that a sprayer delivers the appropriate amount of solution over the sprayed area, interpret herbicide labels to identify guidelines for safety, dosage and application procedures, and perform the calculations necessary for determining appropriate amounts of herbicide, carrier and adjuvant to add to a spray tank.

EPWS 513. Introduction to Scientific Writing
3 Credits (3)
Students will learn how to communicate, through written format, to both the scientific community and diverse audiences. Students will be introduced to new technologies and new genres of scientific writing. Students will also learn basic reviewing and writing skills that underlie efficient preparation of literature reviews, scientific manuscripts, project reports, blog-posts, opinion or perspective pieces for more popular venues, advocacy articles for legislators, and descriptive pieces for popular venues such as newspapers, magazines, and broadcast media. Emphasis will be on the communication of experimental findings in peer-reviewed scientific journals.
Learning Outcomes
1. Students will review the basics of rhetoric and the technology of language.
2. Students will learn how to overcome writing barriers and gain confidence in their writing skills.
3. Students will improve their writing skills so that manuscript preparation becomes more efficient and productive.
4. Students will learn professional standards for the conduct of ethical reporting of scientific results.
5. Students will learn to recognize structural and stylistic elements in scientific articles that help researchers achieve certain communication goals.
6. Students will learn the basics of table, figure, diagram, and image presentation in manuscripts.
7. Literature reviews, framed so that they answer an important question in the field, and lead to peer-reviewed publication, may also be prepared. (With permission of the instructor.)

EPWS 514. Plant Physiology
3 Credits (3)
Overview of photosynthesis, respiration, water relations of plants, minerals and organic nutrition, growth and development.
Prerequisite: BIOL 2110G, CHEM 1225G.
Learning Outcomes
1. Summarize the chemical and physical bases for processes in plants involving water relations, metabolism, and growth.
2. Compare and contrast forms of photosynthesis that are adaptive, and not adaptive, to heat and drought.
3. Explain physiological mechanisms supporting plant tolerance to abiotic and biotic stresses.
4. Predict consequences of environmental change on physiological processes and growth of individual plants.
5. Apply course concepts to real-world scenarios that involve plant function and plant development.

EPWS 520. Environmental Behavior of Pesticides (so)
3 Credits (3)
Behavior of these compounds in the environment, their function toward target and non target pest organisms including humans, effect of environmental conditions on pesticide function, ecology of organisms involved in pesticides degradation,overview of environmental regulation. CHEM 2115 recommended prior to course. May be repeated up to 3 credits.

EPWS 525. Scientific Writing- How to be a Productive and Effective Writing
1-3 Credits (1-3)
Students will learn to improve their writing skills so that their manuscript preparation process is more efficient and productive. Students will also gain experience in peer-review. Crosslisted with: AGRO 525, HORT 525 and SOIL 525.

EPWS 549. Special Problems
1-4 Credits
Individual investigation in specific areas of entomology, plant pathology, and weed science. Maximum of 4 credits per semester and a total of 6 credits.

EPWS 551. Special Topics
1-4 Credits
Specific subjects and credits to be announced in the Schedule of Classes. Maximum of 4 credits per semester. No more than 9 credits toward a degree.

EPWS 560. Ecology and Management of Invasive Plant Species
3 Credits (3)
An overview of the causes and consequences of plant invasions and invasive plant management, with a focus on critical examination of current literature and paradigms.
Learning Outcomes
1. Students will gain practical and theoretical knowledge to facilitate improved vegetation management by engaging in critical thinking and discussion on a wide variety of topics related to invasive plants.
2. Students will understand why plants invade and how to facilitate prevention of invasion in natural and rangeland areas
3. Further, students will gain knowledge of the tools and practices of invasive plant management.

EPWS 562. Parasitology
3 Credits (3)
Introduction to classification, biology, ecology and management of the major parasites of human, domestic animals and wildlife.
Learning Outcomes
1. Students will learn about the major parasites of human, domestic animals, and wildlife.
2. Students will learn how to detect, identify, and manage parasites in the above mentioned mediums.

EPWS 562 L. Parasitology Lab
1 Credit (1)
Introduction to classification, biology, ecology and management of the major parasites of human, domestic animals and wildlife.
Learning Outcomes
1. Students will learn how to conduct lab work to analyze, detect, and identify major parasites of human, domestic animals and wildlife.

EPWS 573. Fungal Biology
3 Credits (2+2P)
Introduction to the taxonomy, morphology, physiology, and ecology of fungi. Same as BIOL 573. May be repeated up to 3 credits.
Prerequisite: EPWS 310 or consent of instructor.
Learning Outcomes
1. To describe the importance of fungi in our environment.
2. To explore the morphology and physiology of major groups of fungi.
3. To describe the associations of fungi with humans, animals, and plants.

EPWS 590. Graduate Seminar
1 Credit (1)
Review of current scientific literature in entomology, plant pathology, and weed science, and verbal presentation of information. No more than 2 credits toward a degree. May be repeated up to 2 credits.
Learning Outcomes
1. To expose students to the fundamentals of speaking, including organization, listening, gestures, vocal variety, and language.
2. To understand components of abstracts for professional meetings and learn to write abstracts.
3. To understand and gain practice in preparation of PowerPoint presentations.
4. To present a professional PowerPoint talk on a scientific topic.
5. To become familiar with components of and preparation of posters for professional meetings.

EPWS 598. Graduate Internship
1-6 Credits
Supervised professional on-the-job learning experience. Limited to Master of Agriculture candidates. Not more than 6 credits toward the degree.

EPWS 599. Master's Thesis
15 Credits
Thesis.

EPWS 606. Biological Control
3 Credits (3)
An introduction to biological control that relies on ecological relationships among populations and the direct or indirect effects of these relationships to humans.
Learning Outcomes
1. Summarize the basic concepts of biological control of arthropods, weeds, and some pathogens.
2. Explain the benefits, challenges, and risks of biological control technologies.
3. Apply course concepts to real-world scenarios that involve biological control.

EPWS 613. Introduction to Scientific Writing
3 Credits (3)
Students will learn how to communicate, through written format, to both the scientific community and diverse audiences. Students will be introduced to new technologies and new genres of scientific writing. Students will also learn basic reviewing and writing skills that underlie efficient preparation of literature reviews, scientific manuscripts, project reports, blog-posts, opinion or perspective pieces for more popular venues, advocacy articles for legislators, and descriptive pieces for popular venues such as newspapers, magazines, and broadcast media. Emphasis will be on the communication of experimental findings in peer-reviewed scientific journals.
Learning Outcomes
1. Students will review the basics of rhetoric and the technology of language.
2. Students will learn how to overcome writing barriers and gain confidence in their writing skills.
3. Students will improve their writing skills so that manuscript preparation becomes more efficient and productive.
4. Students will learn professional standards for the conduct of ethical reporting of scientific results.
5. Students will learn to recognize structural and stylistic elements in scientific articles that help researchers achieve certain communication goals.
6. Students will learn the basics of table, figure, diagram, and image presentation in manuscripts.
7. Literature reviews, framed so that they answer an important question in the field, and lead to peer-reviewed publication, may also be prepared. (With permission of the instructor.)

EPWS 625. Advanced Scientific Writing
3 Credits (3)
The class is intended for graduate students who have obtained data from their graduate research program and are engaged in the analyses of their results (typically at or beyond the midway mark of their research program). At the end of the semester, it is anticipated that Ph.D. students enrolled in the 625 level offering shall have completed a manuscript that is essentially ready for submission to a journal. Master of Science students may also reach this level of completion, but it is dependent on each student's specific situation.
Learning Outcomes
1. Students will learn how to overcome writing barriers and develop a writing schedule.
2. Students will learn how to better organize the results of their experiments into effective tables and figures.
3. Students will improve their writing skills so that manuscript preparation becomes more efficient and productive.
4. Students will learn how to successfully navigate a manuscript through the entire manuscript preparation, revision, review and publishing process.
5. Students will learn professional standards for the conduct of ethical reporting of scientific results.
6. Students will learn professional standards for conducting objective, rigorous reviews of scientific manuscripts.

7. Students will successfully communicate their research findings to the scientific community through publication in peer-reviewed, scientific journals.

EPWS 640. Tropical Insect Ecology
3 Credits (3)
This course is designed to expose students to world of insects and other arthropods living in a variety of tropical environments. We will explore multiple habitats in search of these fascinating organisms. Students will gain valuable experience on the biology, identification, field sampling techniques, and ecology of tropical arthropods. We will examine the biodiversity of these important organisms and gain a better understanding of their diminishing habitats.
Learning Outcomes
1. Students will gain experience in the biology and identification of tropical insects and other arthropods.
2. Students will gain experience in insect biodiversity and proper field sampling techniques in a variety of habitats.
3. Students will gain experience on the issues affecting threatened habitats.

EPWS 660. Ecology and Management of Invasive Plant Species
3 Credits (3)
An overview of the causes and consequences of plant invasions and invasive plant management, with a focus on critical examination of current literature and paradigms.
Learning Outcomes
1. Students will gain practical and theoretical knowledge to facilitate improved vegetation management by engaging in critical thinking and discussion on a wide variety of topics related to invasive plants.
2. Students will understand why plants invade and how to facilitate prevention of invasion in natural and rangeland areas.
3. Further, students will gain knowledge of the tools and practices of invasive plant management.

EPWS 662. Parasitology
3 Credits (3)
Introduction to classification, biology, ecology and management of the major parasites of human, domestic animals and wildlife. May be repeated up to 3 credits.
Learning Outcomes
1. Students will learn about the major parasites of human, domestic animals, and wildlife.
2. Students will learn how to detect, identify, and manage parasites in the above mentioned mediums.

EPWS 662 L. Parasitology Lab
1 Credit (1)
Introduction to classification, biology, ecology and management of the major parasites of human, domestic animals and wildlife.
Learning Outcomes
1. Students will learn how to conduct lab work to analyze, detect, and identify major parasites of human, domestic animals and wildlife.

EPWS 675. Urban Entomology
3 Credits (3)
Study of insects and related arthropods in urban settings, about their impact on humans and damages to building. Principles of Integrate Pest Management (IPM) strategies with emphasis on current control techniques for detection, control and monitoring. May be repeated up to 3 credits.
Prerequisite: Either BIOL 2610G or BIOL 2110G.
Learning Outcomes
1. Students will learn about arthropods commonly located in urban environments.
2. Students will learn how to properly manage Pests and strategies implemented in modern pest management.
3. Students will gain sufficient knowledge in how to detect, monitor, control, and implement pest management strategies in the modern world.

EPWS 690. Doctoral Seminar
1 Credit (1)
Current research discussions presented by doctoral level graduate students. Not more than 2 credits toward the degree. May be repeated up to 2 credits.
Learning Outcomes
1. Students will learn how to gather, structure, and give oral presentations of research at the doctoral level.

EPWS 6991. Doctoral Research
1-15 Credits (1-15)
Research. May be repeated up to 88 credits.
Learning Outcomes
1. Varies based on research being conducted and type of outcome being sought.

EPWS 6996. Advanced Topics
1-6 Credits (1-6)
Topics of current interest, designated by title and credit. Maximum of 6 credits per semester. No more than 9 credits toward a degree. May be repeated up to 9 credits.
Learning Outcomes
1. Student learning outcomes will varied based on type of research, topic, or subject being taught.

EPWS 7000. Doctoral Dissertation
1-15 Credits (1-15)
Dissertation. May be repeated up to 88 credits.
Learning Outcomes
1. Varies.

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