

# 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)

- Agricultural Biology (Applied Biology) - Bachelor of Science in Agriculture (<http://catalogs.nmsu.edu/nmsu/agricultural-consumer-environmental-sciences/entomology-science/agricultural-biology-applied-biology-bachelor-science-agriculture/>)
- Agricultural Biology (Applied Microbiology) - Bachelor of Science in Agriculture (<http://catalogs.nmsu.edu/nmsu/agricultural-consumer-environmental-sciences/entomology-science/agricultural-biology-applied-microbiology-bachelor-science-agriculture/>)

- Agricultural Biology (Entomology) - Bachelor of Science in Agriculture (<http://catalogs.nmsu.edu/nmsu/agricultural-consumer-environmental-sciences/entomology-science/agricultural-biology-entomology-bachelor-science-agriculture/>)
- Agricultural Biology (Environmental Biology) - Bachelor of Science in Agriculture (<http://catalogs.nmsu.edu/nmsu/agricultural-consumer-environmental-sciences/entomology-science/agricultural-biology-environmental-biology-bachelor-science-agriculture/>)
- Agricultural Biology (Invasive Pest Biology and Management) - Bachelor of Science in Agriculture (<http://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 (<http://catalogs.nmsu.edu/nmsu/agricultural-consumer-environmental-sciences/entomology-science/general-agriculture-bsag/>)

### Master Degree(s)

- Agricultural Biology - Master of Science (<http://catalogs.nmsu.edu/nmsu/graduate-school/agricultural-biology-master-science/>)

## Minors for the Department

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

### Professor, Gerald K. Sims, Department Head

**Professors** Creamer, Bundy, Sanogo, Thomas, Thompson; **Associate Professors** Hanson, Mesbah, Pierce, Romero, Schutte; **Assistant Professors** Lehhoff; **Affiliated Faculty** Schroeder, Sweet, Bleiweiss; **College Assistant Professor** Lewis; **College Associate Professor** Randall; **Emeritus Professor** Arnold, Richman

*G.K. Sims, Department Head, Ph.D. (Purdue)– soil microbiology; weed science; C. S. Bundy, Ph.D. (Georgia)– entomology; R. Creamer, Ph.D. (California-Davis)– plant pathology; N.P. Goldberg, Ph.D. (Arizona)– plant pathology; S. Hanson, Ph.D. (University of Wisconsin)– molecular plant pathology; E. Lehhoff, Ph.D. (Montana State) Ecology and Environmental Science; B. E. Lewis, M.S. (New Mexico State)– economic entomology; A.O. Mesbah, Ph.D. (University of Wyoming)– weed science; J. Breen Pierce (Rutgers)– entomology; J. Randall, Ph.D. (New Mexico State University)– plant pathology; A. Romero, Ph.D. (University of Kentucky)– Entomology; S. Sanogo, Ph.D. (Pennsylvania State)– plant pathology; B. Schutte, Ph.D. (Ohio State)– Horticulture & Crop Science; C. A. Sutherland, Ph.D. (Oregon State)– extension entomology; S. H. Thomas, Ph.D. (Iowa State)– nematology; D.C. Thompson, Ph.D. (Colorado State)– entomology.*

## 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

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### 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.

**Prerequisite(s):** BIOL 2610G, or BIOL 2110G.

### 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 insect 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(s):** BIOL 2610G, or BIOL 2110G.

### 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(s):** BIOL 2610G, or BIOL 2110G.

### 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. Crosslisted with: AGRO 311.

**Prerequisite(s):** CHEM 1215G, and BIOL 2110G.

### 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.

**Prerequisites:** BIOL 2110G, CHEM 1225G.

### 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.

### EPWS 373. Fungal Biology 3 Credits (2+2P)

Introduction to the taxonomy, morphology, physiology, and ecology of fungi. Same as BIOL 373.

**Prerequisites:** EPWS 310 or BIOL 311, or consent of instructor.

**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. May be repeated up to 3 credits.

**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. Graded S/U.

**Prerequisite:** consent of instructor.

**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 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.

**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.

**Prerequisite:** consent of instructor.

**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. Crosslisted with: EPWS 505.

**Prerequisite(s):** Either EPWS 303 or EPWS 310 or EPWS 311, or consent of instructor.

**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. May be repeated up to 3 credits.

**EPWS 462. Parasitology****3 Credits (3)**

Introduction to classification, biology, ecology and management of the major parasites of human, domestic animals and wildlife.

**EPWS 462 L. Parasitology Lab****1 Credit (1)**

Introduction to classification, biology, ecology and management of the major parasites of human, domestic animals and wildlife. May be repeated up to 1 credits.

**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.

**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.

**Prerequisites:** EPWS 303, EPWS 310.

**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(s):** Either BIOL 2610G or BIOL 2110G.

**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. May be repeated up to 3 credits.

**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. Crosslisted with: AGRO 511.

**Prerequisite(s):** CHEM 1215G and BIOL 2110G.

**EPWS 514. Plant Physiology**

**3 Credits (3)**

Overview of photosynthesis, respiration, water relations of plants, minerals and organic nutrition, growth and development.

**Prerequisite(s):** BIOL 2110G, CHEM 1225G.

**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 573. Fungal Biology**

**3 Credits (2+2P)**

Introduction to the taxonomy, morphology, physiology, and ecology of fungi. Same as BIOL 573.

**Prerequisite:** EPWS 310 or consent of instructor.

**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.

**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.

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