

AGRO-AGRONOMY

AGRO 1110G. Introduction to Plant Science (Lecture & Lab)

4 Credits (3+2P)

This is an introductory course for understanding plant science. Basic biological, chemical, and physical principles of various plants are covered. The focus of this course is on plants/crops used in agriculture production of food and fiber as well as pasture and range plants. Plant taxonomy and soil properties will also be discussed. Same as HORT 1115G.

Learning Outcomes

1. Describe the basic structure of plants including growth and function.
2. Define photosynthesis, respiration, and translocation
3. Utilize plant taxonomy techniques to identify various plants.
4. Classify soils based on their chemical and physical properties.
5. Explain how different soil properties affect plant growth and sustainability.

AGRO 2160. Plant Propagation

3 Credits (2+2P)

Practical methods of propagating horticultural plants by seed, cuttings, layering, grafting, division and tissue culture. Examination of relevant physiological processes involved with successful plant propagation techniques. Crosslisted with HORT 2160.

Learning Outcomes

1. Practical methods of propagating plants by seed, cuttings, layering, grafting, division, and tissue culture through experiential, "hands-on" laboratories.
2. Relevant physiological principles involved in propagating horticultural plants through lecture discussions and readings.

AGRO 2996. Special Topics

1-4 Credits (1-4)

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. May be repeated up to 9 credits. Consent of Instructor required.

Learning Outcomes

1. Varies

AGRO 300. Special Topics

1-4 Credits (1-4)

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. May be repeated up to 9 credits. Consent of Instructor required. Restricted to Las Cruces campus only.

AGRO 303V. Genetics and Society

3 Credits (3)

Relates the science of genetics with social ramifications. Ways in which genetics and evolution interact with social, political, and economic issues. Includes genetic engineering, gene therapy, DNA finger-printing, ancient DNA, plant and animal improvement, and future prospects. Students required to formulate value judgments on contemporary biological issues that will impact society. Crosslisted with: GENE 303V.

Learning Outcomes

1. Explain foundational genetic concepts and modern biotechnological techniques, including whole genome sequencing and genetic variation.
2. Analyze the implications of genetic technologies, such as cloning, gene therapy, genetic testing, and DNA forensics, to society.

3. Evaluate ethical issues surrounding genetic applications, including genetic discrimination, eugenics, and ownership of genetic information.
4. Develop and defend informed arguments about controversial topics in genetics (cloning and stem cells), using scientific evidence and ethical reasoning.
5. Collaborate on a group project (a term paper) to research and present real-world genetics-related issues and their impact on society.

AGRO 305. Principles of Genetics

3 Credits (3)

Covers fundamental principles of reproduction, variation, and heredity in plants and animals. May be repeated up to 3 credits.

Prerequisite: (BIOL 2610G and BIOL 2110G, or BIOL 2110G and BCHE 140, and either CHEM 1215G or CHEM 1216).

Learning Outcomes

1. To provide an introduction to the basic concepts, methods, and terminology of genetics. Introduction to genomics and bioinformatics.
2. To develop a working understanding of genetics and heredity
3. To understand in some depth, the mechanism of DNA replication, transcription and protein synthesis. To understand the regulation of gene expression.
4. To examine the impact of genetics on both basic and applied aspects of the biological sciences, as well as its effects on our everyday lives.

AGRO 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.

AGRO 365. Principles of Crop Production

4 Credits (3+3P)

Basic principles of crop production including environmental and physiological factors limiting production, plant nutrition and soil science, soil-water management, cropping systems and management, pest management, and economic factors influencing crop production. Taught with HORT 365. May be repeated up to 4 credits.

Prerequisite: AGRO 1110G/HORT 1115G, CHEM 1215G or equivalent and MATH 1215 or equivalent.

Learning Outcomes

1. Analyze and apply core principles of crop production, including environmental, physiological, and climatic factors, to optimize plant growth, yield, and overall production efficiency.
2. Demonstrate understanding of plant biology by identifying structures, growth stages, and functions across the plant life cycle.
3. Evaluate plant propagation and reproduction methods by distinguishing between sexual and asexual techniques, explaining pollination and fertilization processes, and discussing their impact on genetic improvement and crop uniformity.
4. Demonstrate proficiency in seed and equipment technologies, including identification and calibration of farm implements, calculation of seed rates, and evaluation of certified seed quality and planting operations.
5. Apply experiential learning methods to design, manage, and assess crop production systems using real-world data and reflection-based decision-making models (Kolb's learning cycle).

AGRO 377. Introduction to Turfgrass Management

4 Credits (3+3P)

Establishment and maintenance of turfgrass with emphasis on seeding methods, soil and water management, mowing, disease, insects and turfgrass varieties. Consent of instructor required. Crosslisted with: HORT 377

Learning Outcomes

1. Identify the general morphology of grass plants and the characteristics of cool- and warm-season grasses.
2. Explain various turf establishment techniques and procedures.
3. Demonstrate understanding of basic soil science, soil testing, amendments, and fertilization regarding cultural and maintenance procedures as well as seasonal projects to maintain healthy turf.
4. Recognize and identify common turf disturbances including weed, pest, and disease identification.
5. Communicate turf conditions and the rationale for different maintenance processes on the course or field.

AGRO 391. Internship

1-6 Credits

Professional work experience under the joint supervision of the employer and a faculty member. A written report is required. No more than 6 credits toward a degree. Consent of Instructor required. Graded: S/U Grading (S/ U, Audit).

Prerequisite(s): Consent of instructor.

AGRO 447. Seminar

1 Credit (1)

Organization, preparation, and presentation of current topics in agronomy, environmental sciences, horticulture, and soil science. Crosslisted with: SOIL 447, HORT 447 and ENVS 447.

Learning Outcomes

1. Develop professional communication skills through teamwork, case study preparation and presentation, data interpretation, and role-playing in mock interviews.
2. Prepare a professional resume, personal statement of goals for graduate school or permanent employment and make a Case Study presentation to faculty and peers.

AGRO 449. Special Problems

1-3 Credits (1-3)

Research problem, experience training, or other special study approved by a faculty adviser. Maximum of 3 credits per semester and a grand total of 6 credits. May be repeated up to 6 credits. Consent of Instructor required.

AGRO 450. Special Topics

1-4 Credits (1-4)

Specific subjects to be announced in the Schedule of Classes. Maximum of 4 credits per semester and a total of 9 credits toward a degree. May be repeated up to 9 credits. Consent of Instructor required.

AGRO 462. Plant Breeding

3 Credits (3)

Principles and practices involved with the genetic improvement of plants.

Prerequisite: ANSC/AGRO/BIOL/HORT/GENE 305, or GENE 320.

Learning Outcomes

1. Determine important plant traits and develop means to obtain trait variation for any plant species.
2. Create a plan for obtaining plant germplasm for any plant species.
3. Synthesize 3-5 breeding objectives that are obtainable for the breeding of any plant species.
4. Propose different breeding methods for use to develop cultivars for any plant species.
5. Work as a team with other students to produce a comprehensive breeding plan to develop cultivars for any plant species.

AGRO 471. Plant Mineral Nutrition

3 Credits (3)

Basic and applied aspects of plant requirements for soil-derived minerals and the processes whereby minerals are acquired, absorbed, translocated, and utilized throughout the plant. Same as HORT 471 and EPWS 471.

Prerequisite/Corequisite: EPWS 314/BIOL 314, or concurrent enrollment, or consent of instructor.

Learning Outcomes

1. Describe essential plant minerals, how each plant mineral is acquired, the function of each plant mineral, and how plants regulate internal mineral content.
2. Diagnose plant mineral disorders and stress.
3. Demonstrate ability to understand plant nutrient analyses, this includes: 1) perform the activities and conversions to understand the analyses and 2) make recommendations based on analyses.
4. Develop and present a fifteen-minute presentation describing aspects of a specific crop including information on 1) fertilizer needs and rates, leaf nutrient values, and nutrient disorders 2) roles and function of a minimum of one specific mineral used by selected plant, and 3) environmental and sustainability issues with managing the fertilization chosen crop.

AGRO 483. Advanced Sustainable Crop Production

4 Credits (3+3P)

Characteristics and objectives of sustainable agricultural systems with application to the production, utilization, and improvement of agronomic and vegetable crops.

Prerequisite: AGRO 365 or HORT 365.

Learning Outcomes

1. Design and evaluate sustainable cropping systems by integrating principles of crop diversification, crop rotation, no-till, and organic practices, and assessing their advantages, challenges, and impact on long-term agricultural sustainability.
2. Analyze and apply crop and soil management strategies using holistic and integrated approaches, including mycorrhizal fungi use in

arid environments, IPM (Integrated Pest Management), and the "many little hammers" approach to weed control.

3. Select and recommend crop cultivars and management practices for specific agronomic and horticultural crops using tools such as growing degree days, variety test reports, and region-specific criteria (for New Mexico).
4. Critically review and communicate sustainable agricultural research and practices by analyzing case studies, scientific literature, and peer presentations to evaluate the effectiveness of sustainability-focused strategies.
5. Identify and engage with agricultural support systems and sustainability networks, including agencies like Western SARE, to explore resources for funding, research, and application of sustainable agriculture practices.

AGRO 492. Diagnosing Plant Disorders

3 Credits (2+3P)

Systematic diagnosis of the physiological, pathological, and entomological causes of plant disorders. Same as EPWS 492 and HORT 492.

Prerequisites: EPWS 303 and EPWS 310.

AGRO 500. 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.

AGRO 505. Research Orientation

4 Credits (3+2P)

Training in writing research proposals, presentation of research results, and interpretation of research results. Crosslisted with: HORT 505, SOIL 505 and ENVS 505.

Learning Outcomes

1. Gain insight into the nature of scientific research and skills vital for graduate research and future careers in science.
2. Navigate graduate school processes and protocols.
3. Demonstrate critical thinking.
4. Generate a scientific hypothesis.
5. Communicate science effectively in written and oral formats, including drafting a proposal for thesis or dissertation research.

AGRO 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.

AGRO 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.)

AGRO 516. Molecular Analysis of Complex Traits

3 Credits (3)

Provide a comprehensive overview of molecular genetic analysis of complex phenotypes, including case histories/experiments in plants, animals and humans. Emphasize technological developments in DNA marker technologies and their application to molecular quantitative genetics. Explore the efficient application of these technologies in the future to complex genetic systems, breeding, and other areas of life sciences. Same as HORT 516.

Prerequisite: AGRO 305 or consent of instructor.

AGRO 525. Scientific Writing- How to be a Productive and Effective Writer 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: HORT 525, EPWS 525, SOIL 525, AGRO 625, HORT 625 and SOIL 625.

AGRO 590. Graduate Seminar

1 Credit (1)

Current research discussions presented by masters level graduate students. Not more than one credit toward the degree. Same as HORT/SOIL 590. Crosslisted with: HORT 590 and SOIL 590.

AGRO 595. 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.

AGRO 596. Masters Proposal

1 Credit (1)

Current research proposal written by masters level graduate students. Consent of Instructor required. Crosslisted with: ENVS 596, GENE 596, HORT 596 and SOIL 596. Restricted to: Masters HORT; Masters PLEN majors.

Prerequisite(s): Master level graduate students.

AGRO 597. University Teaching Experience

1-3 Credits (1-3)

Certain graduate students will be permitted to teach up to one-third of one AGRO/HORT/SOIL/ENVS course. The student will prepare and deliver lectures and will prepare, administer, and grade at least one examination. The professor in charge of the course will attend and evaluate the student's lectures.

AGRO 598. Special Research Programs

1-6 Credits

Individual investigations, either analytical or experimental. Maximum of 6 credits per semester. No more than 9 credits towards degree. Same as SOIL 598.

AGRO 599. Master's Thesis

15 Credits

Thesis.