SOIL-SOIL

SOIL 2110. Introduction to Soil Science
3 Credits (3)
An overview of fundamental concepts in soil science and soils as a natural resource. Students will be introduced to the physical, chemical, and biological properties as it relates to soil management in environmental science, conservation, and agronomy. May be repeated up to 3 credits.
Prerequisite: (CHEM 1120G and MATH 1215 or higher) or CHEM 1215G.
Learning Outcomes
1. Understand and use the technical terminology associated with the use and management of soils.
2. Understand the classification of soils and the processes leading to their formation.
3. Identify key physical, chemical, and biological properties of soils.
4. Explain the impact of land use and management decisions as it relates to soil degradation and environmental problems.

SOIL 2110L. Introduction to Soil Science Laboratory
1 Credit (1)
Morphological, chemical, physical and biological properties of soil in the laboratory and field.
Corequisite(s): SOIL 2110.
Learning Outcomes
1. Learn techniques for sampling and characterizing soils in the region.
2. Understand how soils are formed and the processes that occur within the soil profile.
3. Gain fundamental knowledge on soil physical, chemical, and biological properties and how each can influence the overall function of a particular soil.
4. Develop critical thinking and analytical skills within laboratory and field settings.
5. Encourage collaboration, inclusiveness and critical thinking.

SOIL 2996. 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. May be repeated up to 9 credits. Consent of Instructor required.
Learning Outcomes
1. Varies

SOIL 300. Special Topics
1-4 Credits
Specific subjects and credits 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.

SOIL 312. Soil Management and Fertility
3 Credits (3)
Management, conservation, and fertility of soils; physical conditions affecting growth, nutrition, and plant production.
Prerequisite: SOIL 2110.
Corequisite: SOIL 312L.
Learning Outcomes
1. Explain the elements affecting soil productivity.
2. Determine what factors influence fertilizer use and needs.
3. Identify factors affecting soil pH and summarize materials used for pH modification.
4. Recognize typical nutrient deficiency symptoms and their general location on the plant.
5. Calculate soil amendment amounts needed for field applications.

SOIL 312 L. Soil Management and Fertility Lab
1 Credit (1)
Hands-on experience. Includes field trips, videos, calculations, visiting lecturers and other lab activities as possible.
Prerequisite: SOIL 2110.
Corequisite: SOIL 312.
Learning Outcomes
1. Use proper procedures to collect soil samples and prepare them for analyses including documentation, pretreatment, and storage.
2. Extract various nutrients from soil and interpret/convey the results in written reports.
3. Explain the difference between total and plant-available nutrients.
4. Observe lab analytical procedures and field practices common in soil fertility and management.
5. Calculate the amounts of nutrients in soil samples and convert to field scale.

SOIL 370. Environmental Soil Science
3 Credits (3)
Continuation of SOIL 2110 that emphasizes soil properties and processes that directly relate to environmental pollution problems. Same as ENVS 370.
Prerequisite: SOIL 2110.

SOIL 391. Internship
1-6 Credits (1-6)
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).

SOIL 424. Soil Chemistry
3 Credits (3)
Basic elements of soil chemistry including clay mineralogy, cation and anion exchange and the chemistry of problem (acid, saline and flooded) soils. Credit not given for both SOIL 424 and SOIL 479.
Prerequisite: SOIL 2110L or CHEM 1215G and CHEM 1225G.
Learning Outcomes
1. Explain the solid and liquid phases of soil.
2. Describe the chemical reactions and processes that occur between various soil phases.
3. Describe the techniques used to promote plant productivity and land remediation.
4. Calculate nutrient and contaminant concentrations in soil samples and convert to field scale.
5. Calculate soil chemical properties including CEC, pH, EC, SAR, nitrate, and convert them between old and new units.

SOIL 447. Seminar
1 Credit (1)
Organization, preparation, and presentation of current topics in agronomy, environmental sciences, horticulture, and soil science. Crosslisted with: AGRO 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.

SOIL 449. Special Problems
1-3 Credits
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.

SOIL 450. Special Topics
1-4 Credits
Specific subjects to be announced in the Schedule of Classes. Maximum of 4 credits per semester and a total of 9 credits towards a degree. May be repeated up to 9 credits. Consent of Instructor required.

SOIL 456. Irrigation and Drainage
3 Credits (3)
Principles and practices required for irrigation to exist as a permanent economy. Equipment and methods for measurement and control of water.

SOIL 472. Soil Morphology and Classification
4 Credits (2+2P)
Same as SOIL 472. Crosslisted with: SOIL 472.
Learning Outcomes

1. Describe soil profile morphology at a competitive level.
2. Understand the processes that drive soil formation and use this knowledge to identify common landforms.
3. Classify soils using Soil Taxonomy.
4. Interpret available soil mapping products to infer soil use and management conditions.

SOIL 476. Soil Microbiology
3 Credits (3)
Nature and physiology of soil microorganisms, how they affect plant growth and recycle nutrients. Land farming, bioremediation and other environmental problems as influenced by soil microorganisms. SOIL 2110 and BIOL 311 recommended. Same as BIOL 476.
Learning Outcomes

1. Explain foundational concepts of the soil environment and soil microbiology, including the soil habitat, the rhizosphere, microbial taxonomy, and microbial cell structure and function.
2. Analyze the diversity, physiology, and ecological functions of soil microorganisms—such as bacteria, archaea, fungi, micro-algae, and micro-fauna—and evaluate their interactions with plants and the soil environment.
3. Apply core soil microbiological techniques—including culturing, inoculation, microscopy, and DNA sequencing—to isolate, identify, and characterize soil microorganisms.
4. Evaluate real-world applications of soil microbiology in areas such as organic matter decomposition, nutrient cycling, integrated disease management, bioremediation, and wastewater treatment.
5. Effectively Communicate evidence-based strategies for enhancing soil microbial diversity and soil health through practices like soil amendments, cover cropping, crop rotation, and conservation tillage.

SOIL 476 L. Soil Microbiology Laboratory
1 Credit (3P)
Enumeration of soil microorganisms, their activities, and transformations they mediate. May be repeated up to 1 credit.
Corequisite: SOIL 476.
Learning Outcomes

1. Collect, store, and characterize soil samples using appropriate and sterile techniques of soil microbiology.
2. Observe, describe, and recognize major groups of microbial organisms
3. Develop skills in basic microscopy, isolation and culturing of soil microbes
4. Acquire basic DNA-based molecular skills in soil microbiology.
5. Compare and evaluate soil samples from different microhabitats regarding their soil microbiota.
6. Apply the scientific method including the following steps: developing a research question, constructing a testable hypothesis, design a research study to test the hypothesis, perform the experiment and collect data, analyze the results, evaluate the results and support/reject the hypothesis, and report the results.

SOIL 477. Environmental Soil Physics
3 Credits (3)
A description of the physical characteristics of porous media including soil. Examination of processes describing the transport of water, chemicals, heat and gases through porous media with application to environmental quality, waste management, and crop production.

SOIL 477 L. Environmental Soil Physics Laboratory
1 Credit (1)
Concurrent enrollment with SOIL 477 recommended. Hands on experience with techniques for characterizing soil physical properties such as particle size distribution, bulk density, water retention, hydraulic conductivity and solute transport. Demonstrations of field and laboratory techniques for measuring moisture content, soil water potential, gas/air flow and thermal conductivity.
Prerequisite(s): SOIL 2110.

SOIL 479. Environmental Soil Chemistry
3 Credits (3)
Basic elements of soil chemistry including discussion of clay mineralogy, cation and anion exchange and the chemistry of problem (acid, saline and flooded) soils. Credit not given for both SOIL 424 and SOIL 479.
Prerequisite: SOIL 2110L or CHEM 1215G and CHEM 1225G.
Learning Outcomes

1. Describe and explain the solid and liquid phases of soil.
2. Explain the chemical reactions and processes that occur between soil phases.
3. Use soil chemistry processes and properties to promote plant productivity and land remediation.
4. Calculate nutrient and contaminant concentrations in soil samples and convert to field scale.
5. Calculate soil chemical properties including CEC, pH, EC, SAR, nitrate, and convert them between old and new units.

SOIL 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.

SOIL 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, AGRO 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.

SOIL 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.)

SOIL 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: AGRO 525, AGRO 625, HORT 525, HORT 625, SOIL 625 and EPWS 525.

SOIL 590. Graduate Seminar
1 Credit (1)

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

SOIL 596. Masters Proposal
1 Credit (1)

Current research proposal written by masters level graduate students. Consent of Instructor required. Crosslisted with: AGRO 596, ENVS 596, GENE 596 and HORT 596. Students must be a Master level graduate student to enroll in this course. Restricted to: Masters HORT; Masters PLEN majors.

SOIL 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.

SOIL 598. Special Research Programs
1-6 Credits

Individual investigations, either analytical or experimental. Maximum of 6 credits per semester. No more than 9 credits toward a degree.