

AGRI 0221 - INTRODUCTION TO SOIL SCIENCE

Catalog Description

Advisory: Eligibility for ENGL 1A

Hours: 90 (36 lecture, 54 laboratory)

Description: Soils as natural bodies formed by interactive environmental processes, classification and characteristics. Soil response to use and management including erosion, moisture retention, structure, cultivation, organic matter and microbiology. Laboratory topics include soil type, classification, soil reaction, soil fertility and physical properties of soil. (CID AG-PS 128 L) (CSU, UC)

Course Student Learning Outcomes

- CSLO #1: Analyze local soil quality as affected by human and natural activities.
- CSLO #2: Apply soil nutrient cycles to soil, plant, and soil organism relationships.
- CSLO #3: Analyze the features of a soil profile and relate to soil and agricultural management practices.
- CSLO #4: Describe the organic breakdown cycle of a soil and the role of organisms in soil physical and chemical properties.
- CSLO #5: Read a soil map, explain the importance of soil mapping and relate it to how to locate a specific site using both township/range and GIS (Geographic Information Systems).

Effective Term

Spring 2021

Course Type

Credit - Degree-applicable

Contact Hours

90

Outside of Class Hours

72

Total Student Learning Hours

162

Course Objectives

Lecture Objectives:

1. Analyze local soil quality as affected by human and natural activities.
2. Relate local geographical features to local soils.
3. Evaluate parent rocks and other soil forming processes influence on local and global soils.
4. Differentiate the qualities of a soil by its classification.
5. Read a soil map, explain the importance of soil mapping and relate it to how to locate a specific site using both township/range and GIS (Geographic Information Systems).
6. Demonstrate an understanding of the classification of local and global soil orders (i.e., soil taxonomy).
7. Discuss the importance of essential plant nutrients to soil.

8. Demonstrate how to determine a Soil Storie Index Rating and a Natural Resources Conservation Service land capability class.
9. Apply soil nutrient cycles to soil, plant, and soil organism relationships.
10. Compare and contrast soil management practices and relate them to soil conservation and sustainability.
11. Compare and contrast the roles of different organisms in a soil food web.
14. Analyze the features of a soil profile and relate to soil management practices.
15. Describe the organic breakdown cycle of a soil and the role of organisms in soil physical and chemical properties.
16. Compose a scientific paper based on data collected in the course following the format of a professional soil science journal.

Laboratory Objectives:

1. Demonstrate hands-on, practical experience with the tools and techniques of soil science.
2. Evaluate soil for its physical, chemical and morphological properties.
3. Evaluate a soil system for factors of sustainability.
4. Analyze a soil's microbiological activity level.
5. Demonstrate the determination of the following soil physical properties: textures (two methods), use of texture triangle, bulk density, particle density, pore space, organic content, color, pH, structure, conductivity and reactivity.
6. Evaluate, appraise and analyze soils using appropriate terminology.
7. Evaluate a soil's water holding capacity, plant available water, properties and movement of water in soil.
8. Assess and evaluate the anion and cation exchange capacity for a given soil.
9. Design and carry out an experiment implementing the scientific method and employing basic data collection and analysis procedures.

General Education Information

- Approved College Associate Degree GE Applicability
 - AA/AS - Physical Sciences
 - AS - Physical Science Lab
- CSU GE Applicability (Recommended-requires CSU approval)
 - CSUGE - B1 Physical Science
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

Articulation Information

- CSU Transferable
- UC Transferable

Methods of Evaluation

- Classroom Discussions
 - Example: Students will participate in a group discussion on the use of synthetic fertilizers. This discussion will include comparing and contrasting and/or debating various points of view while relating them to current soil management protocols. Students will be evaluated based on participation and incorporating course content. Lecture Objectives: 1, 7, 9, 10, 14
- Objective Examinations
 - Example: Students will take an objective examination on plants. Example Question: List and explain the various reasons a plant may be deficient in iron. It has been suggested that some yard plants suffer iron deficiencies because of unnecessary annual fertilization with phosphorus—include an explanation of this in your answer. Performance will be evaluated based on accuracy,

completeness of answer and usage of proper terminology.

Lecture Objectives: 7, 9

- Reports
 - Example: Scientific Paper Assignment (Soil Biology and Biochemistry Format) Purpose: The purpose of this assignment is to familiarize students with experimental methodology and interpretation. Writing style, grammar, and sentence structure will be evaluated. Method: A hypothesis will be provided to the class for discussion. From this hypothesis, students will develop an experimental design that will serve to test this experiment in the absence of environmental or genetic variables that may alter or bias the data. Over the course of several weeks, students will participate in every aspect of the experiment, including 1) implementation of experimental protocol; 2) collection of research data; 3) summary, analysis and interpretation of research data; 4) development of a scientific paper in journal format. Paper will be assessed based upon correct use of research paper format and a rubric developed by the instructor and shared with students. Lecture Objective: 16 Laboratory Objective: 10
- Skill Demonstrations
 - Example: Students will demonstrate determining soil texture by using the hand texturing soil technique. Students will be evaluated on properly employing the hand texturing soil technique as well as proper determination of texture of soil samples. Lab Objectives: 1, 2, 6

Repeatable

No

Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. Instructor will demonstrate the use of a soil classification triangle to determine soil texture. Students will then prepare a soil sample and then demonstrate the use of a soil classification triangle. Performance will be evaluated based on the proper calculations of percentage of sand, silt and clay in their samples. Laboratory Objectives: 1, 2, 6

Lecture:

1. Instructor will present in lecture format various management techniques and their relation to soil conservation. Students will then work collaboratively, in small groups, analyzing case studies highlighting management practices and discuss options for agriculture producers featured in these case studies to increase the sustainability of soils by relating management practices to the lecture. Groups will report out summaries of their individual case studies and their recommendations. Lecture Lecture Objectives: 10, 14

Typical Out of Class Assignments

Reading Assignments

1. Read the assigned pages from the textbook and be prepared to discuss the differences in the phases of soil formation. 2. Read current scientific

articles regarding soil science and be prepared to discuss them, as well as use the data presented in them for other assignments.

Writing, Problem Solving or Performance

1. Write a series of one page reports on uses and their impacts on soil quality. An example is a paper highlighting the use of animal manure and its impacts on improving water use and the factors that need to be monitored regarding this management practice. 2. Write a paper on an issue facing soils used for agriculture production. Potential topics include soil leaching, erosion, and soil loss.

Other (Term projects, research papers, portfolios, etc.)

Required Materials

- Explorations into a Dynamic Process-Oriented Soil Science
 - Author: Frink, Douglas
 - Publisher: Elsevier Science Ltd
 - Publication Date: 2011
 - Text Edition: 1st
 - Classic Textbook?: No
 - OER Link:
 - OER:
- Elements of the Nature and Properties of Soils
 - Author: Nyle Brady
 - Publisher: Prentice Hall
 - Publication Date: 2009
 - Text Edition: 3rd
 - Classic Textbook?: No
 - OER Link:
 - OER:
- Soil Science and Management
 - Author: Plaster, Edward
 - Publisher: Delmar
 - Publication Date: 2013
 - Text Edition: 6th
 - Classic Textbook?: No
 - OER Link:
 - OER:
- Soil Genesis and Classification
 - Author: Stanley W. Buol
 - Publisher: Wiley-Blackwell
 - Publication Date: 2011
 - Text Edition: 6th
 - Classic Textbook?: No
 - OER Link:
 - OER:

Other materials and-or supplies required of students that contribute to the cost of the course.