

NRM 2305 Soils
Fall 2022

Professor: Dr. Bonnie Warnock

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Office Hours: RAS MW 9:00-10:30 and WSB TT 9 :00-10:30; Other times by appointment

Course description:

The origin, formation, and classification of soils, as well as their physical, chemical, and biological properties. Organic matter, moisture, and soil fertility maintenance are also covered.

Class meetings:

Lecture: Monday and Wednesday 2:00-2:50

Lab: Wednesday 3:00-4:50

Please dress appropriately for lab. We will be going in the field on several occasions and working with chemicals in the lab. Please wear long pants and closed toe shoes. Be sure to bring a calculator when we are working inside as you will need to perform calculations each week to determine the physical and chemical properties of your soil.

Program Learning Outcomes for a B.S. in Natural Resource Management

The graduating student will be able to demonstrate that he/she is able to:

1. Identify species of wildland plants and wildlife common to the western United States and describe their natural history.
2. Demonstrate knowledge of elements of an ecosystem
3. Communicate about natural resources and conservation both verbally and in writing
4. Conduct range and wildlife inventories in a team setting
5. Apply knowledge of elements of an ecosystem into an appropriate conservation management plan

Course Objectives

1. Students will be able to state the importance of soils in ecosystems
2. Students will be able to understand the important physical and chemical characteristics of the soil.
3. Students will be able to integrate the knowledge of soil characteristics into other areas such as agronomy and range science.

Students will be expected to develop the following skills through both lecture and lab.

1. Team work: Students will learn team work in lecture with a class project on building and maintaining a compost pile and all lab work will be conducted in groups.
2. Communication: Students will improve communication skills through group discussions for soil challenges in lecture and in written reports in lab.
3. Quantitative and empirical skills: Students will develop quantitative skills in both lecture and lab through calculations of soil physical and chemical characteristics.

4. Critical thinking: Students will practice critical thinking in soil challenges in lecture and in the application of knowledge gained in lab to specific uses for their soil sample.

Recommended Texts:

Elements of the Nature and Properties of Soils (3rd or 4th editions).

Soils in our Environment (11th edition)

Building Soil: A Down to Earth Approach by Elizabeth Murphy

Lab manual, notes and assignments will be on Blackboard.

Tentative Course Outline:

| Lec # | Topic | Lab # | Topic |
|------------------------|---------------------------------------------------------|------------|-------------------------------------------------------|
| 1 (8-22) | Introduction and Definition of Soil | 1 | First week no lab |
| 2 (8-24) | Soil Composition and Importance | 2 (8-31) | Soil Physical Properties in lab |
| 3-4 (8-29, 31) | Physical properties of soils | 3 (9-7) | Soil Morphology in the field |
| 5-6 (9-5, 7) | Soil Parent Materials and Soil Formation | 4 (9-14) | Soil Landscape Relationships in the field |
| 7-8 (9-12, 14) | Soil Taxonomy | 5 (9-21) | Soil Surveys in the computer lab |
| 9 (9-19) | Test 1, Paper 1 | 6 (9-28) | Sample prep, morphology, and Soil Bulk Density in lab |
| 10-12 (9-21, 26, 28) | Soil Water | 7 (10-5) | Soil Particle Size and Texture in lab |
| 13-14 (10-3, 5) | Soil Aeration and Temperature | 8 (10-12) | Soil Water in lab |
| 15-17 (10-10, 12, 17) | Soil Reaction, including acidic and salt affected soils | 9 (10-19) | Soil pH and Salinity in lab |
| 18 (10-19) | Test 2, Paper 2 | 10 (10-26) | Soil Calcium content in lab |
| 19-20 (10-24, 26) | Soil Carbon, Organic Matter and Soil Biota | 11 (11-2) | Soil Aggregate Stability in lab |
| 21-23 (10-31, 11-2, 7) | Plant Nutrients and Soil Fertility Mgt | 12 (11-9) | Soil Biological Activity in lab |

Everyone Completes:

Class Attendance & In Class Soil Challenges 100 points

Laboratory 200 points

Participation 50 points

Lab V-maps 100 points

Lab final 50 points

Grade assignment: <60 = F; 60-69 = D; 70-79 = C; 80-89 = B; 90-100 = A;

Assignments and Lab

Exams and the Final will be multiple choice questions. You will need to bring a calculator to each exam as some questions will require you to complete calculations i.e. volumetric water content, irrigation and fertilizer recommendations etc. These are multiple choice questions but you will need to make sure you read the question carefully and think about what I am asking! The final will be made from questions from the first three tests.

Papers will be written over a topic related to Soils that is covered in the section of class prior to the due date. Papers are due the same date that tests will be administered. The final poster will be on a selected applied Soils topic and will be turned in as a Power Point slide.

Chapter Homework and Soil Challenges are take home and online assignments that must be completed each week. They will all be submitted on Blackboard. The final poster will be on a selected applied Soils topic and will be turned in as a Power Point slide.

Soil Challenges are in class assignments and questions that are designed to test critical thinking skills and your understanding of soil principles. For group discussion assignments in lecture your responses will be graded based on your participation in the group discussion. One of the soil challenges will be building and maintaining a class compost pile. You will be required to work as a group to collect materials and a schedule will be developed for teams of two to turn the pile on a regular basis.

The Lab is designed to develop your understanding of soil by testing and learning about a soil sample that you collect. This will be a team effort and your team will be assigned the first day of lab. Each team will collect a soil sample, describe the area where the sample was collected, and conduct a series of lab tests to determine the physical and chemical properties of your soil sample. An individual weekly report submitted on the Vmap template will be required. A comprehensive written lab report Vmap that summarizes your findings on the soil sample and discusses the strengths and weaknesses of your soil as it applies to agriculture and rangeland will be written by each individual based on the team data collection. Please be sure to bring a calculator to lab each week.