

NRSM 212N – Ecology, Physics and Taxonomy of Soils
Fall 2023

This course introduces students to the physical, chemical, and biological properties of soils, and on how water moves into and out of soils. Students will assess properties and processes of Earth's soils, differentiate between different soils, and be able to describe the causes and consequences of variations in soils and soil properties and how they influence soil water quantity, quality and land management actions. NRSM 212N is designed to strengthen student's comprehension of concepts and theory presented in the NRSM 211N lecture through a series of "hands on" field and laboratory-based experiments. Over the course of the semester, students are exposed to a suite of soil and water analysis techniques and will be able to describe and understand the relationships among soils, soil water physics, nutrients and vegetation on the landscape based upon experiments and analysis of their results. The laboratory develops students understanding of the scientific method, measurement uncertainty and analytical techniques for soil and ecosystem studies. Students demonstrate comprehension through a series of laboratory quizzes, group discussion, team-oriented data collection and self-guided laboratory assignments.

Learning Outcomes:

Theory and Practice - Students will compare, contrast and predict soil physical, chemical and hydrological properties based on a series of quantitative investigations. Students will apply these principles and the scientific method in the context of forest and grassland ecosystems and demonstrate the ability to solve quantitative, interdisciplinary, real-world problems.

Laboratory Skills and Procedure - Students will be able to design and execute an experimental procedure, work independently, interpret experimental results, and draw a reasonable, accurate conclusion. Students will synthesize concepts in soil and water science using modern methods and instrumental techniques.

Communication and Information Literacy - Students will use computer technology to gather, process, analyze, and present chemical data, and communicate critical analysis of scientific information through written reports, laboratory notebooks and oral presentations.

Readiness for Advanced Coursework - Students will be prepared to take advanced courses in their degree program that require understanding of the scientific method, analytical techniques, measurement uncertainty and ability to synthesize environmental data.

Instructors:

Name: Dr. Kelsey Jencso (Lead Instructor)

Department: Forest Management

Office: CHCB 423A (The Science Complex)

Phone: 243-6793

Email: kelsey.jensco@umontana.edu

Office Hours: Tuesday 10:30 – 11:30 AM and by appointment via email

Name: Dr. Cory Cleveland
Department: Ecosystem & Conservation Sciences
Office: CHCB 423B (The Science Complex)
Phone: 243-6018
Email: Cory.Cleveland@umontana.edu
Office Hours: Tuesday 10:20 – 11:00 AM and by appointment via email

Laboratory Schedule

Laboratory topics:

Lab #	Lab Week	Lab Assignment
1	8/28	No lab
2	*9/4	Geology and Soil Minerals (CC; Stone 306)
3	9/11	State Factors: Topography and Soil Formation (CC; field)
4	9/18	Forest Soils: Albic and Argillic Horizons (CC; field)
5	9/25	Topography and Soil Water Content & Soil Sampling (KJ; field)
6	10/2	Soil Physical Properties: Texture (KJ; Stone 306)
7	10/9	Soil Physical Properties: Density and Porosity (KJ; Stone 306)
8	10/16	Infiltration and Hydraulic Conductivity (KJ; field)
9	10/23	Soil Structure and Aggregate Stability (KJ; Stone 306)
10	10/30	Soil Engineering: Soil Liquid Limit & Plasticity (KJ; Stone 306)
11	11/6	Digital Soil Surveys (CC; Stone 306)
12	11/13	Soil Chemistry (CC; Stone 306)
13	11/20	Thanksgiving Week – No lab
14	11/27	Integration: Putting it all Together (CC; Stone 306)

Lab location & Time: 2:00 – 5:00 PM, M, T, W

All labs will meet in Stone Hall 306. On the days we are in the field, we will still meet in Stone 306, but move together to the loading dock behind the Science Complex (south side of the Clapp Building) at 2:15

for departure to the field locations. Please be advised that all laboratory exercises start promptly at 2:00 PM in Stone 306.

Lab Book: The lab handouts will be available on-line (Moodle) prior to each week's lab. Please print them out and read them before coming to lab each week, and bring it to class. Quizzes prior to each week's lab will be given regularly to evaluate your preparedness.

***Labor Day week, no Monday lab.** Students in the Monday section will still be responsible for the material presented in lab 1. Stone 306 will remain open for students to review mineral specimens and and complete the lab on their own time during the week.

Lab Preparation: Prior to each lab, students should read the assigned material in the lab manual. There will be regular quizzes covering lab material, so please come prepared.

Grading and Assignments:

Lab reports: 80%

Quizzes: 20%

In class quizzes will cover material in the lab manual. As long as you read the labs in advance, you should do well. All lab reports should be typewritten and turned in in class the week after the lab meets. Late lab reports will receive a 10% deduction per day. When calculating final lab grades, we will drop the lab with the lowest grade. **Finally, while you are free to work in small groups to go over lab data and discuss results, lab reports must be completed on your own, and submitted labs must be your own (unique) work.** Copying or turning in nearly identical lab reports is considered plagiarism and is not acceptable; all parties will receive zeros for plagiarized lab reports. **All lab reports must be typed. Handwritten reports will not be accepted.**

Lab Instructors/TAs:

Carly Innis: carly.innis@umontana.edu

Robbie Heumann: Robert.heumann@umontana.edu

TA's do not hold regular office hours. To meet with your lab instructor/TA, please email them directly to schedule an appointment.

Class Attendance Policies:

Students are strongly encouraged to attend all class meetings and complete all assignments for courses in which they are enrolled. Instructors may excuse brief and occasional absences for reasons of illness, injury, family emergency, religious observance or participation in a University sponsored activity (University sponsored activities include for example, field trips, ASUM service, music or drama performances, and intercollegiate athletics). Instructors shall excuse absences for reasons of military service or mandatory public service.

Recommended Preparation:

- Successful completion of a university-level chemistry course (e.g., CHMY 121N). This is

- recommended but not required.
- Come to class and be prepared to participate.
- Before lab, read the assigned material and be prepared to answer questions. Quizzes covering the reading are fair game.
- Check Moodle a few days following the lecture for possible changes to posted class materials and to begin review.
- Turn in assignments on time.

Other, Warnings, Caveats, Red Tape, and University Considerations:

You are expected to read the assigned material, and will be responsible for its content. We will ask a lot of you in this class, and expect a high level of commitment to the course. A knowledge of the factors that determine ecosystem structure and function is integral to understanding a range of critical environmental issues the world now faces. Just like in many areas of science, to deal with those issues, you must first learn the basics of the discipline. And hopefully along the way you have some fun!

Students with Disabilities:

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and the [Office for Disability Equity \(ODE\)](#). If you think you may have a disability adversely affecting your academic performance, and you have not already registered with ODE, please contact ODE in Aber Hall (1st floor) or 406.243.2243. We will work with you and ODE to provide an appropriate modification.

Course Withdrawal Deadlines and Drop/Add Policies:

[Course withdrawal deadlines](#) are published on the UM Website prior to the start of each semester. Please review them carefully.

Rules concerning academic honesty:

All students must adhere to UM policies on academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the [Student Conduct Code](#). Academic misconduct includes plagiarism. Don't plagiarize someone else's work, period.

UM Career Readiness Resources:

The W.A. Franke of Forestry and Conservation is committed to the career success of our students. We encourage you to participate in [ElevateU](#) – UM's signature career readiness program – to ensure that you graduate career-ready, with the education, skills, and tools needed to launch, carry-on, and pivot your post-graduation career. Participation in ElevateU is free and can be started at any time, no matter where you are in your academic or career journey. Get started by creating a profile on [Handshake](#) to search for jobs and internships or by [scheduling an appointment](#) with an [Experiential Learning and Career Success \(ELCS\)](#) career coach or advisor.