

FIELD METHODS IN VEGETATION ECOLOGY

Summer 2025— Syllabus

16 June – 3 July 2025

University of Colorado Mountain Research Station

1. Overview

Field Methods in Vegetation Ecology is a survey of physical and biological processes that control the distribution and dynamics of vegetation and common methods used to understand these patterns. Through fieldwork and individual projects, students will gain hands-on experience regarding concepts and field methods in vegetation science. Based at the CU Mountain Research Station, we will spend 3 weeks exploring the ecology of the region – from Great Plains grasslands to the Continental Divide, with a focus on dynamics of upper montane, subalpine, and alpine landscapes. Fieldwork will emphasize recognizing and understanding the environmental context of plant communities.

Course components –

- Background lectures
- Field trips (Plains-to-tundra altitudinal transect)
- Field exercises
- Readings
- Individual research projects

Prerequisites –

- One year of course work in general biology or environmental science, or consent of instructor

Credits – Three 4000-level EBIO credits

Schedule – 3 weeks (4 weekdays/week – variable to allow for holidays, see Schedule below), 8am-5pm, some days 7:30am-5pm.

Time for completing assignments and project fieldwork may require working over the weekends (Friday-Sunday).

Texts

Recommended Floras: you will be happy to have one of your own, but a few available at MRS

Ackerfield, J. *Flora of Colorado*. 2nd Edition (2022, ISBN 978-1889878898). BRIT Press, Botanical Research Institute of Texas, Fort Worth, TX. Or, use 1st Edition (2015). \$80.

Weber & Wittmann. 2012. *Colorado Flora: Eastern Slope*, 4th ed. ISBN: 978-1-60732-140-8. \$28.

Optional textbook: copies are available on loan at MRS

Mueller-Dombois & Ellenberg. 2003. *Aims and Methods of Vegetation Ecology*, Reprint of 1st edition, Blackburn Press. ISBN: 978-1930665736. (To purchase, I recommend getting a used copy of the original, higher quality edition, if possible: 1974, John Wiley & Sons, ISBN: 0471622907.)

2. Instructors

Dr. Elise Pendall, Ecosystem Ecologist
Email: elise.pendall@colorado.edu

Karin Edwards, Field Botanist
email: karinjedwards@gmail.com

3. Learning objectives: After this class, students should be able to:

1. Understand and describe the key concepts of vegetation ecology
2. Identify common Colorado Front Range vascular plants
3. Distinguish plant communities and their landscape distribution patterns
4. Design and implement a vegetation field study
5. Communicate scientific results orally in a PowerPoint presentation

4. General topics include:

1. Concepts of communities – complementary perspectives
2. Vegetation classification systems – physiognomic, floristic approaches (e.g., US National Vegetation Classification System)
3. Structure and function of North American biomes/ecoregions
4. Factors controlling the distribution and dynamics of vegetation at continental, regional, landscape, and site scales – and ways to study vegetation at each of these scales
 - a. Climate, physiography, soils, biotic interactions, time (disturbance, succession)
5. Concepts in field research design
 - a. Assessing vegetation in space (classification, mapping, microhabitat studies)
 - b. Assessment in time (vegetation dynamics, monitoring)
 - c. Setting up hypotheses-driven experiments
6. Practicalities of field research
 - a. Defining a research question
 - b. Sampling protocol development (field technique selection, sampling design, etc.)
 - c. Orienteering: map, compass, GPS, clinometer
 - d. Supplemental data resources – vegetation/soil maps, site histories
 - e. Data management (QA)
 - f. Data analysis (see Statistics)
 - g. Communication of results (graphic visualization, oral and written presentation)
7. Plant identification skills
 - a. Major vascular plant family characteristics
 - b. Identification of common Colorado Rocky Mountain genera and species
 - c. Use of dichotomous keys
8. Statistics – tools and design considerations
 - a. Descriptive stats
 - b. Exploratory stats – cluster analysis, ordination
 - c. Hypotheses testing
9. How field studies interface with other areas in vegetation/landscape/ecosystem science
 - a. Conservation, land management
 - b. GIS, remote sensing applications
 - c. Simulation (numerical) modeling – parameterization, validation

5. Grading, based on:

- Participation in field exercises (20%)
- Written assignments & in-class activities (45%)
- Project (design, implementation, and presentation) (30%)
- Field journal (5%)

Final grades assigned as follows: A 90-100%, B 80-89%, C 70-79%, D 50-69%, F <50%

6. Schedule – Times: 8am-5pm, but will differ depending on day's activities
NOTE that the schedule may change if needed

Week 1:	Mon 6/16	Tue 6/17	Wed 6/18	Fri 6/20
<i>Theme</i>	<i>Global</i>	<i>Regional</i>	<i>Landscape</i>	<i>Community</i>
Lecture Topic	Climate, Physiognomy; Aims & Applications	Physiography Structure-Function	Topography, Soils	Biotic Interactions Disturbance
Activity	North American Vegetation/Biomes Colorado Lifezones Five Key Factors	Fieldtrip 1: Plains to Montane (Greenbelt Plateau, Betasso Preserve)	Fieldtrip 2: Subalpine to Alpine (Niwot Ridge)	Data Analysis Workshop: Lifezone Transect
Skills	Vegetation Classification	Quadrats, Transects, Plant Lifeforms, Taxonomy	Soil Taxonomy; Map & Compass	Data Wrangling, QA/QC, Graphs, Statistics; Soils
Evening/Weekend Assignments	Readings (prepare for Essay 1, Field Sampling Techniques)	Readings (prepare research ideas)	Research Idea	Readings (prepare for Essay 2, Lifezone Transect)

Deadlines

Research Idea Fri 9AM; Essay 1 Sat 5PM

Week 2:	Mon 6/23	Tue 6/24	Wed 6/25	Thu 6/26
<i>Theme</i>	<i>Floristics</i>	<i>Research Design & Statistics</i>	<i>Plant Communities</i>	<i>Projects</i>
Activity	Lab: Major Plant Families	Workshop: Lifezone Results	Field study: Elk Meadow Workshop: Data Analysis	Project consultations; Pilot studies
Skills	Plant Taxonomy; Dichotomous Keys, Herbarium Collections	Field study design Statistical tools	Field study design	Analysis of Plant Communities
Evening/Weekend Assignments	Work on Research Proposal (due Weds am)	Work on Research Proposal (due Weds am)	Work on Essay 2 (due Thurs am)	Fri-Sun: Complete Project Data Collection!!

Deadlines

Proposal due Weds 9AM

Essay 2 due Thurs 9AM

Week 3:	Mon 6/30	Tue 7/1	Wed 7/2	Thu 7/3
<i>Theme</i>	<i>Projects</i>	<i>Projects</i>	<i>Projects</i>	<i>Presentations</i>
Activity	Data Analysis Project Consultation	Data Analysis PowerPoint Drafts	Project Consultation	Final Class Presentations
Skills	Statistics, Graphs	Presentation Preparation	Presentation Practice	
Evening/Weekend Assignments			Field journals, PowerPoints	

Deadlines

Draft PowerPoint due Tue 12PM

Field Journals due 9AM; PowerPoints due 9:30AM

University & Course Policies –

Course Policy on Absences

Missing a class can be detrimental to your grade. Each day contributes directly both to your participation grade and any graded activity for the day and cannot be excused or made up unless you have a documented legitimate reason (such as those noted below). *Each day missed works out to be enough points to reduce your letter grade.* In addition, there is an indirect impact from missing skills or other information related to take-home assignments or individual projects covered on any given day.

- 3/2025

Classroom Behavior

Students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote, or online. Failure to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, marital status, political affiliation, or political philosophy. For more information, see the [classroom behavior policy](#), the [Student Code of Conduct](#), and the [Office of Institutional Equity and Compliance](#).

- 1/2025

Accommodation for Disabilities, Temporary Medical Conditions, and Medical Isolation

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your Instructor in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the [Disability Services website](#). Contact Disability Services at 303-492-8671 or DSinfo@colorado.edu for further assistance. If you have a temporary medical condition, see [Temporary Medical Conditions](#) on the Disability Services website. If you have a temporary illness, injury or required medical isolation for which you require adjustment, contact the Instructor in a timely manner.

- 1/2025

Preferred Student Names and Pronouns

CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name.

- 1/2025

In the case that these records do not reflect your preferences, instructors will gladly honor your request to address you by an alternate name or gender pronouns. Please advise your Instructor of this preference early in the course so that we may make appropriate changes to our records.

- 3/2025

Academic Integrity / Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the [Honor Code](#). Violations of the Honor Code may include but are not limited to: plagiarism (including use of paper writing services or technology [such as essay bots]), cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. Understanding the course's syllabus is a vital part in adhering to the Honor Code.

All incidents of academic misconduct will be reported to Student Conduct & Conflict Resolution: StudentConduct@colorado.edu. Students found responsible for violating the [Honor Code](#) will be assigned resolution outcomes from the Student Conduct & Conflict Resolution as well as be subject to academic sanctions from the faculty member. Visit [Honor Code](#) for more information on the academic integrity policy.

- 1/2025

Students should note that their work may be evaluated with a plagiarism detection service; and that this service retains a copy of the submitted work for future comparisons. - 3/2025

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. University policy prohibits [protected-class](#) discrimination and harassment, sexual misconduct (harassment, exploitation, and assault), intimate partner abuse (dating or domestic violence), stalking, and related retaliation by or against members of our community on- and off-campus. The Office of Institutional Equity and Compliance (OIEC) addresses these concerns, and individuals who have been subjected to misconduct can contact OIEC at 303-492-2127 or email CUreport@colorado.edu. Information about university policies, [reporting options](#), and [support resources](#) including confidential services can be found on the [OIEC website](#).

Please know that faculty and graduate instructors must inform OIEC when they are made aware of incidents related to these policies regardless of when or where something occurred. This is to ensure that individuals impacted receive outreach from OIEC about resolution options and support resources. To learn more about reporting and support for a variety of concerns, visit the [Don't Ignore It page](#). - 1/2025

Religious Holidays

Campus policy requires faculty to provide reasonable accommodations for students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Please communicate the need for a religious accommodation in a timely manner. See the [campus policy regarding religious observances](#) for full details. - 1/2025

In this class, it is your responsibility to make such requests to your professor at the start of the course. – 3/2025

Mental Health and Wellness

The University of Colorado Boulder is committed to the well-being of all students. If you are struggling with personal stressors, mental health or substance use concerns that are impacting academic or daily life, please contact [Counseling and Psychiatric Services \(CAPS\)](#) located in C4C or call (303) 492-2277, 24/7. Free and unlimited telehealth is also available through [Academic Live Care](#). The [Academic Live Care](#) site also provides information about additional wellness services on campus that are available to students. - 1/2025