Summer Session 2025
Alpine Ecology: BIOE 416
Course Syllabus

3 Course Credits
July 14-25, 2025
Instructor: Macy Ricketts, Adjunct, University of Montana and Colorado State University
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Course prerequisites: At least one semester of college-level biology, chemistry, ecology and mathematics, or consent of instructor.

I. Course Description

Exploration of the distribution, abundance and biotic interactions of plants, animals, and other organisms and their unique eco-physiological adaptations to life in the rigorous environments of high mountains above the timberline, with emphasis on the Crown of the Continent area. Students learn about the distribution of plants and animals and study the processes and interactions that are the foundation to ecology in alpine environments. Emphasis is placed on the processes that organize communities including drivers of global climate, and the complex interrelationships of biotic and abiotic interactions, including natural and human components as modifiers of system dynamics, and how those processes affect alpine systems. The class is organized around field trips and data intensive class projects that underscore major concepts and allow training in data collection, analysis, writing a scientific paper, presentation, and interpretation by students. Course level: U/G offered for undergraduate or graduate credit.

Ecology is the study of organisms, their relationships to each other, and how they interact with their physical surroundings. As such, we will be examining the ecological factors at play in an alpine environment. The structure of this course is shaped like an hourglass: we will begin at the top of the trophic pyramid, much like what is presented in Lindeman's foundational ecology paper on trophic cascades (Lindeman, 1942). We will perform activities and labs related to each level of the hourglass, from learning how humans have interacted with the alpine, all the way down to geologic processes influencing alpine environments. You can expect interactive readings, lectures, discussions, and activities relating to each topic. Then, based on what you have learned, you are expected to rebuild that pyramid into a final synthesis project that relates your research topic of choice to the broader impacts at play in the alpine environment.

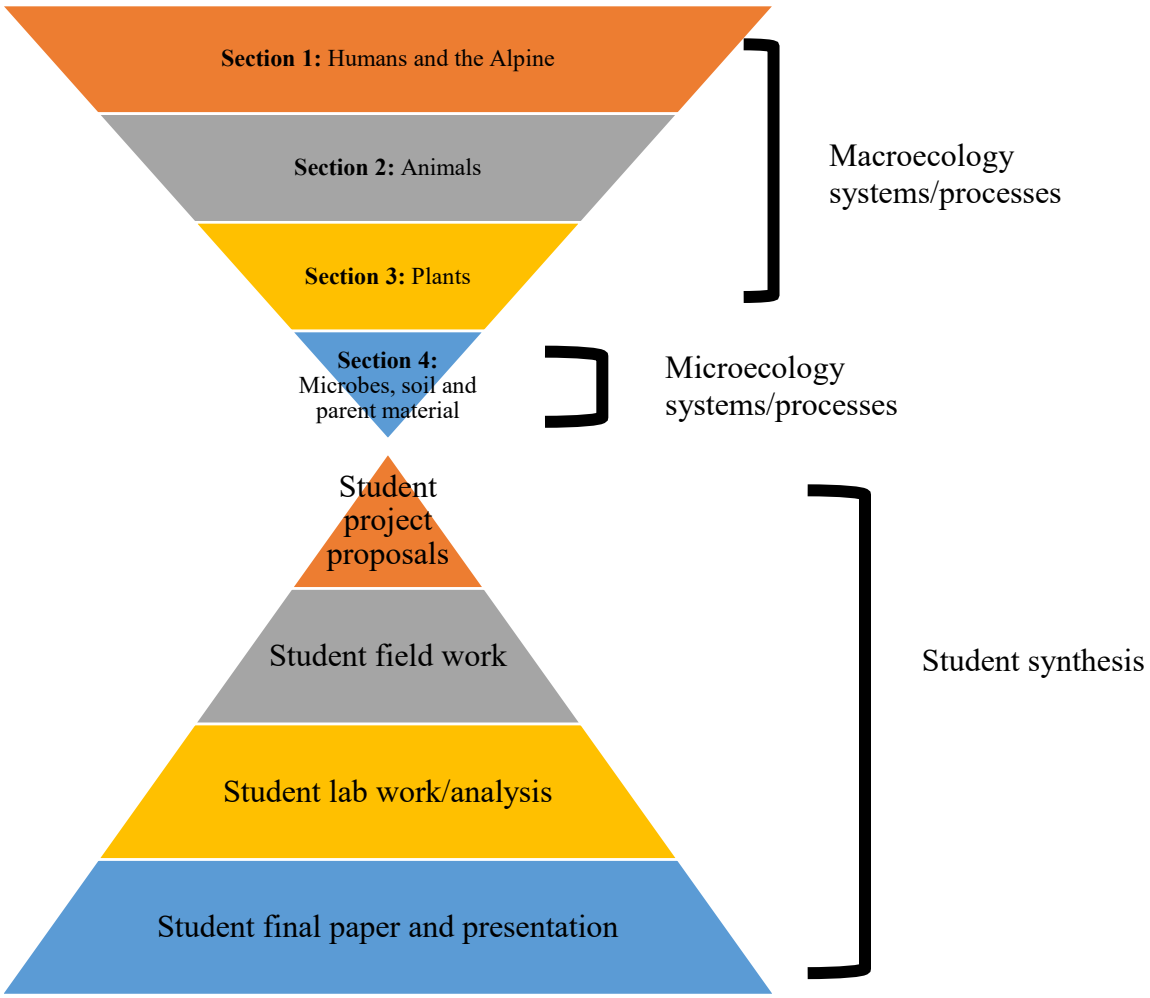

Figure 1 (above): Structure for summer 2023 alpine ecology (BIOE 416) field course.

II. Student Learning Objectives:

1. Understand the fundamental concepts and theories in community ecology and the integrative, multidisciplinary approaches used to study ecological communities.
2. Be able to read, evaluate, interpret, and discuss primary literature and reflect on its scientific *and* societal impact
3. Demonstrate the ability to conduct research in community ecology, keep a field/lab notebook, and write a scientific proposal-style paper

****IMPORTANT NOTE—To enjoy this course and to learn the content fully, you must be in reasonably good physical condition, able to hike up to 10+ miles a day in strenuous conditions at altitude and properly equipped for a great deal of hiking.****

III. Student Learning Expectations

- Students are expected to be active participants in their own learning. It's important to remember that *you* are responsible for *your own* actions.
- Students are expected to be respectful of others' opinions, even if they are different from your own. Students are expected to be *gracious* and *thoughtful* when providing feedback to others – treat your classmates in a manner that you would like to be treated.
- While I will do everything I can to ensure your success in this course, your active participation and effort is required. This being an upper-level course, hard work is expected.
- You are responsible for asking for clarification and extra help when you need it, either during class or post-lecture.
- You are expected to participate in collaborative communication (CC), a practice in which you listen actively to the speaker. Practices involve asking back ("why did you ask that?"), thoughtfully including all parties in the conversation, and providing personal input on each topic. In CC, you act as though the speaker is the most interesting person in the world, and that everything they say is important and pertinent to conversation. It is my job as the facilitator to redirect conversation where needed.
- You are expected to participate in active learning, which is a practice in which you can demonstrate what you've learned in this class through designing and carrying out experiments and a presentation (refer to figure below, from Jackson, 2016). ***Again, active participation in class discussions and projects is crucial for your success in this course!***

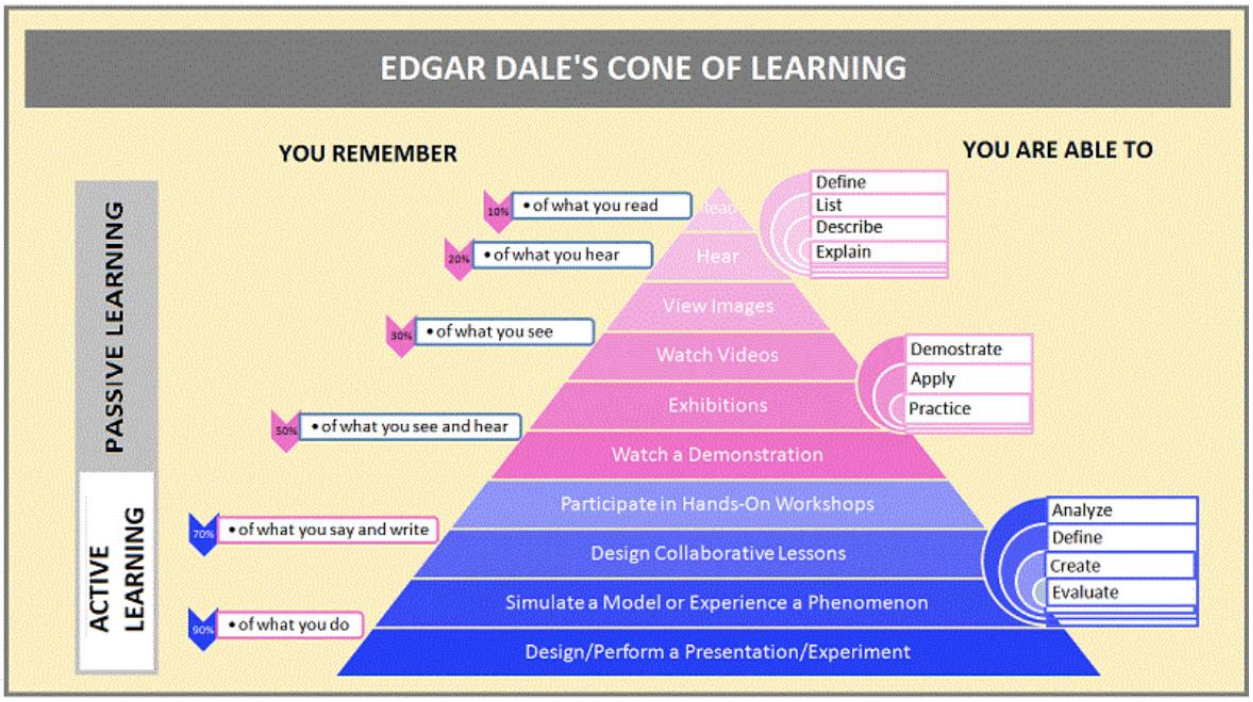

Figure 2 (above): Edgar Dale's Cone of Experience, as detailed in Jackson, 2016.

IV. Instructor Expectations

As your instructor for this course, it is imperative that I provide an environment in which you feel accepted, honored, and in which you learn deeply. You can expect me to:

- Give students' papers back in a timely manner
- Give constructive criticism and feedback on your work
- Have passion for the material
- Listen and respond to student concerns
- Care not only about your learning, but also about your personal development
- Have respect for your time, both in class and out
- Foster thoughtful class discussions
- Provide a detailed rubric for each assignment
- Provide inspiration to students and encourage different viewpoints

You can NOT expect me to:

- Be available to you 24/7 outside of classroom hours
- Change an assignment grade once it has been given
- Give you a grade that you haven't earned
- Complete assignments for you

Time is a gift, not a commodity

By adhering to the expectations listed above, you are viewing my time, as well as your classmates' time, as a gift, rather than a commodity. While I understand that you all are paying to be here, it is your responsibility to practice empathy when communicating with your instructor, classmates, and staff.

V. Course Texts

Required Text: Lesica, Peter. 2012. Manual of Montana Vascular Plants, Botanical Research Inst of Texas. ISBN-10: 1889878391, ISBN-13: 978-1889878393 (available for purchase at the FLBS Bookstore).

Reference Texts: Electronic copies of supplementary material will be provided by the professor. Other reference books and field guides will be available in the classroom. We will be doing a fair amount of place-based learning, i.e., in the field, so please *print* electronically provided texts before your departure for the course if you don't want to bring your laptop on our hikes!

Required Materials: Materials marked with an asterisk are available for purchase at the FLBS bookstore.

Students should bring the following supplies:
- Rite in the Rain field notebook*
- College-ruled notebook (in addition to Rite in the Rain notebook)
- Permanent ink pens and a few pencils*
- Hot/cold mug*
- Hand lens*
- Clipboard*
-Small ruler or tape measure (in cm)*
- Water bottle and water bladder
- Lunch pack-up container (resealable)
- Mess kit
- Bear spray*
- Wading shoes or sandals
- Binoculars
- Flashlight (headlamp) and batteries
- Camera (optional, but great scenery in this class)
- Laptop computer with MS Excel & MS Word
- Personal First Aid Kit
- Raincoat

Other *required* gear for overnight trips can be found here:
https://flbs.umt.edu/apps/education/ss_logistics.aspx#Checklists

VI. Assessment Strategies

A written exam, a scientific proposal-style paper produced from research projects conducted in Glacier National Park, a corresponding final presentation (PowerPoint or other), plus active participation in all activities is the basis of your grade and evaluation. You will be required to complete a first draft of the paper in a timely manner, turn the first draft in to me, and I will return an edited version to you soon afterwards. Your paper grade will be based on the final draft you produce from my edits. This provides an excellent opportunity to learn how to write scientific papers and proposals and will demonstrate your level of learning in the course.

Graduate Credit

Graduate student evaluation and grading increment involves completion of a more sophisticated final research paper, based upon original data collected in the field in GNP, that is worthy of publication in a peer reviewed scientific journal. Graduate student final papers will be subject to an alternative, more rigorous, rubric than that of their undergraduate peers.

Assessments	**% of Total Grade *(subject to change)***
Class Participation	10
Written Reflections	20

Lab Assignments	15
Written Exam	15
Final Paper (Individual) – Graduate students use graduate paper rubric	25
Final Presentation (Group)	15
Total	100

Grading Scale

A: 90-100%
B: 80-90%
C: 70-80%
D: 60-70%
F: < 60

Rubrics will be provided for each assessment type to clearly outline expectations for grading purposes. You can expect me to provide feedback for each assignment in a timely manner, so you understand how to proceed with future assignments.

VII. Course Policies

Students are expected to review and adhere to the University of Montana Student Code of Conduct and adhere to the Flathead Lake Biological Station Code of Conduct form signed during student registration. Students must also abide by the FLBS Rules and Regulations and the Safety Orientation Checklist. Students must complete the University of Montana online Prevention Education Programs: AlcoholEdu and Sexual Assault Prevention for Adult Learners.

Diversity and Inclusion Statement

Flathead Lake Biological Research Station and the University of Montana value an educational environment that is diverse, equitable, and inclusive. The diversity that students and faculty bring to the class, including but not limited to age, country of origin, culture, disability, economic class, ethnicity, gender identify, immigration status, linguistic, political affiliation, race, religion, sexual orientation, veteran status worldview, and other social and cultural diversity is valued, respected, and considered a resource for learning. Every student in this classroom, regardless of personal history or identity, is a valued member of this group. Your experiences are valuable, and you should feel free to share them as they become relevant to our class. No student in this class is ever expected to speak for all members of a group. If at any point you feel that there are aspects of course instruction, subject matter, or classroom environment that result in barriers to your inclusion, please contact me privately without fear of reprisal. More information on the

University of Montana's stance on equal opportunity and mandatory reporting can be found here: https://www.umt.edu/equal-opportunity-title-IX/

Students with disabilities may request reasonable modifications by contacting the instructor. The University of Montana assures equal access to instruction for students with disabilities in collaboration with instructors and the Office for Disability Equity. The University does not permit fundamental alterations of academic standards or retroactive modifications. If you have a disability that adversely affects your academic activities, please let us know at summersession@flbs.umt.edu so we can discuss an accommodation.

VIII. Course Schedule

****The schedule may change prior to first day of class and while class is in session due to location availability and field conditions.****

Note: Make sure you pack your brown bag lunch each day at breakfast.

Date	Activity Focus	Camp Location	Activity Type
Day 1 (M) Week 1	Humans and the Alpine, Plants	FLBS/TBD	Course introduction, humans and the alpine, plant ID lab
Day 2 (T) Week 1	Animals	Elkhorn Campground, Many Glacier	Logan Pass observation activity on the way to Many Glacier
Day 3 (W) Week 1	Macroinvertebrates and speciation	Elkhorn Campground, Many Glacier	Macroinvertebrate lab
Day 4 (Th) Week 1	Exam	Elkhorn Campground, Many Glacier/FLB	Depart campground am; arrive back at FLBS late morning; afternoon written exam
Day 5 (F) Week 1	Writing & Review	FLBS	Scientific paper proposal and draft introduction due
Day 6 (M) Week 2	TBD: Plants	FLBS	Plant ecology discussion, vegetation ecology lab
Day 7 (T) Week 2	Lichens	Red Eagle Campground, Two Medicine GNP	Lichen lab in the morning, student project field work in the afternoon

Day 8 (W) Week 2	TBD	Red Eagle Campground, Two Medicine GNP	Student project field work
Day 9 (Th) Week 2	Writing & Review	FLBS	Depart campground am and arrive back at FLBS late morning, work on scientific paper and presentation
Day 10 (F) Week 2	Project Presentations	FLBS	Final presentations and final draft of paper due

IX. References

Jackson, J. (2016). Myths of active learning: Edgar Dale and the cone of experience. *Journal of the Human Anatomy and Physiology Society*, *20*(2), 51-53.

Lindeman, R. L. (1942). The trophic-dynamic aspect of ecology. *Ecology*, *23*(4), 399-417.