**Synopsis:** The course engages major concepts and approaches in modern ecology via immersive field experiences, hands-on sampling, and project-based learning in both aquatic and terrestrial habitats. Topics range from physiological and behavioral ecology to population and community ecology to ecosystem ecology and touches on themes of disturbance, invasive species, and climate change. The course will build students’ natural history knowledge of the biota of the Rocky Mountain region while directly engaging them in active research projects of the instructors. This course is conducted largely outdoors regardless of weather conditions so that ecological phenomena can be examined in real time and real life. **All-day and overnight trips will be conducted throughout the course,** taking students into a range of aquatic and terrestrial environments near the BioStation and the adjacent mountain areas including Glacier National Park. Students should be physically fit and able to hike ~10 miles or more per day. Students will conduct directed measurements connected to ongoing research projects of the faculty, developing technical skills as well as skills in scientific analysis and interpretation in written and oral form. Lecture materials will largely be presented in video format so students should bring laptop, tablet, or smartphone to view materials. This course meets UM writing requirement.

**Learning outcomes:** After taking this course students will have increased knowledge of major ecological concepts and improved proficiency in various field and lab methods as well as in scientific study design and analysis in field ecology.

**Prerequisites:** College level biology, chemistry, and mathematics or permission of instructor.

**TEXTS & MATERIALS** (required)


Electronic copies of other assigned readings & supplementary reference materials will be provided.

You are also required to purchase a Rite-In-The-Rain notebook (All-weather LEVEL no. 313) for use in the class.

**GRADING**

Your grade in this class is determined by five components:

1.) **Field notebooks:** Thoroughness, legibility, content of observations and data entry will be evaluated. *This is important because not just you, but fellow students, will be partly relying on data you record.* Every week you will place photos of field notebook pages and transcribe data from your field notebooks to a shared Google drive by each **Friday 5 PM**. These will be checked weekly by instructors. 15%
2.) **Journal article summaries.** You will prepare a 1-page synopsis of two published research papers relevant to the class themes. These are due by Friday noon during those weeks. Each is worth 10% for a total of 20%

3) **CURE research project report and poster presentations.** 35% of grade (based on final written report (individual; 20%) and final poster (group; 15%).

4) **Exams** (Fridays of weeks 1 and 3 at 8:30AM). Exams will cover material from textbooks, videos, and assigned literature papers during the relevant preceding period (week 1 for Exam 1, weeks 2-3 for Exam 2). Each exam is worth 10%. Overall, exams are 20% of grade total.

5) **Attitude, preparedness, and participation.** Are you ready for class? Do you work cooperatively as a team member? Do you ask good questions? Does rain not bother you too much? 10%

**BRING YOUR LAPTOP COMPUTER or TABLET – all materials are digital.**

**APPROACH AND PHILOSOPHY**

The goal in this class is to give students an immersive, research-oriented, and hands-on learning experience that covers and integrates major concepts and approaches of ecology in both aquatic and terrestrial ecosystems of western Montana. Students will learn the natural history of these habitats and get to know their inhabitants, engage in real scientific field research, and acquire skills in data acquisition, analysis, and interpretation.

Please note - the course is taught mostly outside, regardless of weather, Monday through Thursday, often using 10 hours or more per day. We will hike some almost every day and on some days we will hike all day, studying ecology as we go. Students must be prepared. If you are confident that you can hike at least 10 miles with a light pack in a day, you will really enjoy this course. If you are not sure of your hiking skills in the rough terrain of mountain landscapes or your paddling skills on lakes and rivers but you like to exercise and are really committed to learning ecology in this marvelous field setting, Jim and Diana will help you enjoy hiking and paddling as a part of the ecological experience. You can also expect to get wet, either from the rain or in the process of sampling of lakes and streams. You can also expect to have fun and develop lifelong friendships and professional relationships with your fellow students and with your instructors and other professionals you will meet during the course.

Also note that we seek to create a positive learning environment for all in our class. So, everyone is expected to adhere to the University of Montana Student Conduct Code and Discrimination, Harassment, Sexual Misconduct, Stalking, and Retaliation Policy (policy website: [http://www.umt.edu/safety/policies/](http://www.umt.edu/safety/policies/)) and to the FLBS Code of Conduct form signed during student registration. Students must also follow FLBS Rules and Regulations and abide by the Safety Orientation Checklist. Students who have not already completed the University of Montana PETSA training may access the Moodle module at this link: [http://www.umt.edu/petsa/](http://www.umt.edu/petsa/).

We also expect you to follow norms of academic honesty. Academic misconduct is subject to an academic penalty by the course instructors. All students need to be familiar with the UM Student Conduct Code. The code is available for review online (link: [https://tinyurl.com/y85k9jga](https://tinyurl.com/y85k9jga)). *Cheating WILL get you an F in this course and will be reported to the UM academic office or to your home institution.*

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 Disability Services for Students (406.243.2243, [http://www.umt.edu/dss/default.php](http://www.umt.edu/dss/default.php)). 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 so we can discuss an accommodation.
CURE: Classroom-based Undergraduate Research Experience: Each student will be part of an active, “real world”, research project led by one of your instructors. This project is a major component of your class grade. This project will involve experimental manipulations leading to intensive data collection and analysis; ultimately, a paper will be published in the scientific literature. In the shorter term, each student will prepare a report on his/her results in this research and collaborate with teammates in summarizing their overall findings in a scientific poster presentation. *The purpose of the research project is to provide hands-on experience in planning, conducting, and conveying REAL ecological research.* See information elsewhere with more details about this project.

**Outside of Class:** Use Friday - Sunday periods to read, review, and work on assignments and projects. You cannot do well in this course without reading the text. We will cover many of the major topics in the book during the first week and then reinforce them by repeatedly revisiting concepts and processes as we encounter them during our field trips. Your grasp of these concepts will be assessed in two exams. Students are expected to take notes in the field, make directed measures in the field, and in groups or pairs to analyze and present data (group work products). You will also spend time working on samples and analyzing data from your CURE research project. If any time at all remains (!), hiking on the off days is encouraged because there is so much to see around FLBS but conduct your trips in the context of the course content and be safe.

**Field Supplies/Equipment** (*available for purchase at the FLBS Bookstore):

- Rite in the Rain field notebook
- Permanent ink pens and a few pencils
- Dissecting kit
- Hand lens (Loupe)
- Hot/cold mug
- Packable water bottles (total capacity at least 2 quarts)
- Lunch pack-up container (resealable)
- Mess kit
- Bear spray
- Personal first aid kit
- Binoculars (optional)
- Headlamp and batteries
- Camera (optional)
- Rain gear (incl rain pants)
- Wading shoes or sandals
- Sunglasses

**Required Overnight Field Gear and Other Items to Bring Checklists:** [http://flbs.umt.edu/urls/lists](http://flbs.umt.edu/urls/lists)

**Also:** - Laptop computer with MS Excel & MS Word

**COURSE SCHEDULE**

We follow our schedule *rain or shine*; topics may vary depending on what we encounter in the field. The schedule is kept and updated (live) at the links below. Generally, we will work on our CURE research project on Mondays while Tuesday, Wednesday, and Thursday will involve field trips and fieldwork with overnight trips to Glacier National Park in weeks 2 and 4, and Fridays will involve research project time and exams (week 1 and week 3). You will have Friday afternoons “off” though this is a good time to get caught up on reading, videos, and project work.

Master schedule: [here](#)
Detailed schedule: [here](#)
Simplified schedule: [here](#)