

Aquatic Invertebrate Ecology WILD 485

Location: ISB 008

Day and Time: Wed 12:00-3:50 PM

Instructor: Diana L. Six

Email: Diana.six@umontana.edu

Office hours: Tuesdays 10:30-11:20 or by appointment

Office: Room 104 Bioresearch Building

COVID – Class will meet in person. Masks are required with NO exceptions. We will follow Franke College of Forestry and Conservation and UM guidelines which may shift over time, so please check your email often for guidance. If you are sick or quarantining contact me via email at least 1 hour prior to missed classes so I can keep you up to date with course material.

- If you feel sick and/or are exhibiting COVID-19 symptoms, please don't come to class and contact the Curry Health Center at (406) 243-4330.
- If you are required to isolate or quarantine, you will receive support in the class to ensure continued academic progress.
- UM recommends students get the COVID-19 vaccine. Please direct your questions or concerns about vaccines to Curry Health Center.
- Where social distancing (maintaining consistent 6 feet between individuals) is not possible, specific seating arrangements will be used to support contact tracing efforts.
- Class attendance and seating will be recorded to support contact tracing efforts.
- Drinking liquids and eating food is forbidden within the classroom.
- Mask use is required in vehicles when traveling to field sites as part of class/fieldwork

OBJECTIVES: This course is designed to provide students an understanding of the life histories, ecology and importance of macroinvertebrates in freshwater aquatic systems. The primary focus will be on insects although an introduction to other invertebrates will also be included. The lab portion of the course will involve learning identification of major groups of aquatic macroinvertebrates and participation in an actual long-term environmental assessment using invertebrates as indicators of stream condition and restoration efficacy.

LEARNING OUTCOMES:

Successful students will be able to:

- Describe life histories, behaviors, trophic importance, adaptations, and ecological and conservation significance of aquatic invertebrates
- Identify aquatic macroinvertebrates to appropriate levels for ecological study and environmental sampling
- Understand and execute standard aquatic sampling protocols for aquatic macroinvertebrates

GRADING:

This course is traditional letter grade only. A standard grading scale will be used:

A 100-90%

B	89-80
C	79-70
D	69-60
F	68-0

Lecture section: One midterm, one final: each worth 25% of final grade

Lab section: worth 50% of final grade (see below for breakdown)

Expectations

Attendance is critical. No make-ups for exams without verifiable appropriate excuse. All assignment deadlines are absolute.

Field day is mandatory: We will have one all-day weekend field trip (see schedule).

Text-lecture: Aquatic Entomology, Lancaster, L. and Downes, B. J. Oxford University Press. 2013.

Text-lab: A Guide to Common Freshwater Invertebrates of North America. Voshell, J. R. Jr. McDonald & Woodward Press. 2002.

Lecture schedule

Sept 1 Intro to the course. The importance of macroinvertebrates in aquatic systems. The freshwater habitat. Terminology (Chap. 2, Vannotte et al. 1980, Cummins and Klug 1979)

Sept 8 Restoration of Ninemile Creek, Guest lecture Paul Parson, Trout Unlimited

Sept 15 Biomonitoring, intro to stream restoration (McDermond-Sies et al. 2014, Li et al. 2010)

SATURDAY Sept 18 Full-day field trip to sample invertebrates in Ninemile Creek – meet at Public Safety/Parking Services at 8:30 AM SHARP!!!

Sept 22 Environmental constraints – gas exchange (Chap. 3)

Sept 29 Environmental constraints - physical-chemical gradients and extremes (Chap. 4)

Oct 6 Environmental constraints – biomechanics (Chap. 5)

Oct 13 MIDTERM

Oct 20 Trophic strategies, diet and digestion (Chap. 13, 14)

Oct 27 Development, reproduction Chap. 10, 11, 12)

Nov 3 NO CLASS

Nov 10 Mating, signaling, oviposition, dispersal (Chap. 10, 11)

Nov 17 Population dynamics and persistence, population genetics (Phillips et al. 2015, Alp et al. 2012, Giam et al. 2017, Bogan et al. 2015)

Nov24 Thanksgiving holiday

Dec 1 Effects of disturbance (Rusetta-Lambert et al. 2019, Martens et al. 2019, Robson et al. 2018)

Dec 8 Anthropogenic effects (Murray et al. 2016, Dallas and Rivers-Moore 2014)

FINAL TBA

Lab section

Objectives: 1) To observe first hand, where aquatic macroinvertebrates occur in nature and how environmental conditions affect their distribution and abundance. 2) To gain experience in collecting and identifying aquatic macroinvertebrates. 3) To understand the use of macroinvertebrates in ecological studies and environmental assessments and to assess habitat quality.

Field trip: The trip is **mandatory** and an essential part of learning aquatic invertebrate ecology. During the trip we will learn methods for observing and collecting aquatic macroinvertebrates and sample a stream as a part of a long-term study on stream restoration.

Grading: (50% of total grade – see above)

Lab exam	20%
Lab notebook	30%
Field project	40%
Presentation	10%

Lab notebook: The lab notebook is an essential part of learning macroinvertebrate taxonomy and identification. Directions in developing the notebook will be provided in a separate handout. The lab notebook is **due on Nov 17. No late notebooks will be accepted.**

Field day: *We WILL be getting wet!!!* Bring fishing waders if you have them. I will have some to share. Or wear shorts and bring closed-toed shoes you can wear in the water. 'Wet shoes' are best because they cling while protecting your feet. Closed-toes are important. You will be vigorously kicking rocks and sandals and bare feet are NOT up to the task! Make sure you wear appropriate clothing for the weather, getting in the creek, and bring water and a lunch.

Lab exam: This exam will test your identification skills. It will consist of specimens that you will be expected to identify to order and family.

Field project: This project will introduce course participants to scientific sampling of streams and allow participation in an actual long-term study monitoring the efficacy of a stream restoration project being conducted by Trout Unlimited. During a full-day field trip, we will collect macroinvertebrate samples from various locations on a stream. The specimens in the samples will then be identified in subsequent

lab periods. Once identifications are complete, the data will be entered into Excel and analyzed. A summary of the results will be developed into a final report presented on the last day of class.

Presentation: Groups from the field project will develop and present a 15 minute Powerpoint presentation of your stream sampling results to the class. This will allow everyone to hear what others found and also discuss and compare findings. We will have beverages and snacks!

Lab section topics

Sept 1 Introduction to lab section (Chap. 1 in Lecture text, Pp. 27-67 Lab text)

Sept 8 Morphology, Taxonomy: Find the parts, understanding the parts. Non-insect macros.

Sept 15 Sampling a creek. Field project intro. Insects: Hemiptera, Odonata.

Sept 22 Clean Ninemile Creek samples. Insects: Plecoptera.

Sept 29 Taxonomy: Insects: Ephemeroptera. Work on project collections

Oct 6 Taxonomy: Insects: Trichoptera. Work on project collections

Oct 13 Taxonomy: Insects: Coleoptera, Diptera. Work on project collections

Oct 20 *Practice exam.* Work on project collections/data entry

Oct 27 **LAB EXAM.** Work on project collections/data entry/analysis

Nov 3 NO CLASS

Nov 10 Work on completing projects/presentations LAB NOTEBOOK DUE

Nov 17 Work on completing projects/presentations

Nov 24 Work on completing projects/presentations

Dec 1 Projects due. Give presentations

Dec 8 Open time

General information for the course:

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 anticipate or experience barriers based on disability, please contact the ODE at: (406) 243-2243, ode@umontana.edu, or visit www.umt.edu/disability for more information. Retroactive accommodation requests will not be honored, so please, do not delay. As your instructor, I will work with you and the ODE to implement an effective accommodation, and you are welcome to contact me privately if you wish

Student Conduct Code

All students must practice 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](#).

Course Withdrawal Deadlines

Important Dates Restricting Opportunities to drop/withdraw
<https://www.umt.edu/registrar/calendar/autumn-2021.php>

Classroom Environment Students at University of Montana are diverse in many ways, including race, gender, sexual orientation, age, religion, preparedness, and mobility. Please respect other students and their perspectives. The university's position is: *"The University of Montana respects, welcomes, encourages, and celebrates the differences among us. In recognition of this commitment, we value all members of the campus community, not in spite of, but because of their differences. A campus that expects, reflects, and respects diversity influences the way our students perceive the world. A diverse campus community enriches all of us with a greater understanding of the human condition and the challenges all people must confront in a rapidly changing, increasingly globalized, and ever more interdependent world society."*