

University of Montana

## ScholarWorks at University of Montana

---

University of Montana Course Syllabi

Open Educational Resources (OER)

---

Fall 9-1-2021

### BIOE 370.01: General Ecology

William J. Roach

*University of Montana, Missoula*, [john.roach@umontana.edu](mailto:john.roach@umontana.edu)

Follow this and additional works at: <https://scholarworks.umt.edu/syllabi>

**Let us know how access to this document benefits you.**

---

#### Recommended Citation

Roach, William J., "BIOE 370.01: General Ecology" (2021). *University of Montana Course Syllabi*. 12226.  
<https://scholarworks.umt.edu/syllabi/12226>

This Syllabus is brought to you for free and open access by the Open Educational Resources (OER) at ScholarWorks at University of Montana. It has been accepted for inclusion in University of Montana Course Syllabi by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact [scholarworks@mso.umt.edu](mailto:scholarworks@mso.umt.edu).

# General Ecology

## Syllabus FA 21

BIOE 370, Monday, Wednesday, Friday 10:00-10:50 AM, ISB 110

### Instructor information:

Instructor: W. John Roach

Email: [john.roach@mso.umt.edu](mailto:john.roach@mso.umt.edu)

Office hours: 11 AM – 12 PM Mon & Wed. or by Appointment

Course website: <http://umonline.umt.edu/>

Phone: 406-243-5122 (BIOLOGY OFFICE)

Office: TBD

### Course description:

What is ecology? In 1873, Ernst Haeckel, a German zoologist, coined Ökologie by combining the Greek word oikos, meaning “house, dwelling place, or habitation” and –logia, meaning “study of”. According to his definition, ecology is the study of the relationship of organisms with their environment. Today ecologists like those at the Cary Institute of Ecosystem Studies, define it more specifically. To them (and to us), ecology is:

“The scientific study of the processes influencing the distribution and abundance of organisms, the interactions among organisms, and the interactions between organisms and the transformation and flux of energy and matter.”

Clearly, the study of ecology covers a lot of terrain. In this class we will cover the analysis of the distribution of plants and animals, including individual, population and community-level processes. We will learn about population growth and regulation, competition, predation, succession, and community organization. We will examine how an organism’s physiology affects its distribution. We will also explore aspects of ecosystem ecology including nutrient cycles, energy flow, ecosystem services and climate change.

Ecology is quantitative! I am telling you now: There will be math! Ecologists rely on mathematical models to describe how populations grow, how species interact, and how elements cycle. They use statistics to describe what they have observed and to make inferences about their observations. Simply stated, ecology is impossible to practice without doing a calculation or two here and there.

All students must have taken a year of Intro Bio and completed a course in Genetics and Evolution (BIOB 272) as well as one year of college math including Statistics (STAT 216, MATH 241 or the equivalent). Without these classes, success will be hard to come by.

### Instructor information:

Hello, my name is John Roach. I am an adjunct professor here at the University of Montana and have taught this course on an off over the past 10 years. My background is in biogeochemistry—urban biogeochemistry to be exact—and in community dynamics. However, I have spent the

past decade plus working for a company called SimBio that creates virtual teaching tools. Much of my time there has been spent helping to write and develop the interactive textbook we will use in this course. I enjoy teaching this course because I think science is exciting. It rewards clever, clear, and creative thinkers and I relish sharing how different scientists have figured out challenging problems. Even more, I like interacting with students for I typically learn as much or more from you as you will from me.

## Key Learning Outcomes:

1. Show how the scientific method is used to answer ecological questions.
2. Explain how misinformation and conspiracy theories can be spotted using logic and the scientific method.
3. Defend the assertion that “nothing in biology makes sense except in the light of evolution”.
4. Summarize the evidence supporting the importance of ecological and historical mechanisms in driving biogeographical patterns.
5. Describe how seasonal and spatial climatic variation interact to determine the location of Earth’s major biomes and to limit species distributions.
6. Discuss how variation in life history-strategies results from trade-offs in how organisms deal with constraints on resources.
7. Show how simple mathematical models can be used provide insight into various aspects of population and community ecology.
8. Contrast how bottom-up versus top-down forces and their effects on ecological patterns.
9. Defend the assertion that the first law of thermodynamics (conservation of energy and matter) governs the flow of energy through and the cycling of matter within ecosystems.
10. Defend the assertion that the second law of thermodynamics (inefficient energy transfer and transformations) explains why ecosystems and their component organisms are reliant on a continuous input of energy to maintain order.
11. Convince a lay audience that human alterations of nutrient cycles are impacting the ability of ecosystems to provide critical goods and services.
12. Discuss relationship between temperature and performance across a range of biological scales, from enzymes to species.
13. Defend the assertions that Earth’s climate is warming, that people are responsible, and that the biota is being impacted.

## Required materials:

- SimUText Ecology by SimBiotic Software. SimUText Ecology is a virtual textbook that is required for this class. See registration instructions posted on Moodle.
- iClicker REEF. We will use clickers throughout the class and all students must bring a device (smartphone, tablet, or laptop) that allows you to participate in the on-line polls. More information about iClickers is available on Moodle.
- Additional Required Readings: Occasional required readings will be posted on Moodle.

## Course Calendar:

Lecture	Week	Day	Topic	Reading Assignments*
1	Mon	8/30/21	Class Introduction	<i>Wallace 2009 (OPTIONAL)</i>
2		9/1/21	Evolution and Ecology I	Evolution for Ecology S1-S2
3		9/3/21	Evolution & Ecology II	Evolution for Ecology S3-S4
	Mon	9/6/21	<b>Labor Day - No Class</b>	
4		9/8/21	Physiological Ecology I	Physiological Ecology S1-S2
5		9/10/21	Physiological Ecology II	Physiological Ecology S3
6	Mon	9/13/21	Physiological Ecology III	Physiological Ecology S4
7		9/15/21	Biogeography I	Biogeography S1-S2
8		9/17/21	Biogeography II	Biogeography S3-S4
	Mon	9/20/21	Population Growth I	Population Growth S1-S2
9		9/22/21	Population Growth II	Population Growth S3-S4
10		9/24/21	Population Growth III	Population Growth S5
11	Mon	9/27/21	Life History	<b>TBD</b>
12		9/29/21	<b>TBD Check MOODLE</b>	
13		10/1/21	<b>Exam 1</b>	
14	Mon	10/4/21	Competition I	Competition S1-S2
15		10/6/21	Competition II	Competition S3-S4
16		10/8/21	Predation I	Predation... S1-S2
17	Mon	10/11/21	Predation II	Predation... S3
18		10/13/21	Predation III	Predation... S4-S5
19		10/15/21	Behavior I	Behavioral Ecology S1-S2
20	Mon	10/18/21	Behavior II	Behavioral Ecology S3
21		10/20/21	Behavior III	Behavioral Ecology S4-5
22		10/22/21	Community Structure	<b>TBD</b>
23	Mon	10/25/21	Community Dynamics I	Com. Dynamics S1-S2
24		10/27/21	Community Dynamics II	Com. Dynamics S3-S5
		10/29/21	Disease Ecology I	Disease Ecology S1-S3
	Mon	11/1/21	Disease Ecology II	Disease Ecology S4-S6
26		11/3/21	<b>TBD Check MOODLE</b>	
27		11/5/21	<b>Exam 2</b>	
28	Mon	11/8/21	Ecosystem Ecology I	Ecosystem Ecology S1-S2
29		11/10/21	Ecosystem Ecology II	Ecosystem Ecology S3
		11/12/21	Ecosystem Ecology III	Ecosystem Ecology S4-S5
31	Mon	11/15/21	Decomposition I	Decomposition S1-2
32		11/17/21	Decomposition II	Decomposition S3-4
33		11/19/21	Nutrient Cycling I	Nutrient Cycling S1
34	Mon	11/22/21	Nutrient Cycling II	Nutrient Cycling S2
		11/24/21	<b>Thanksgiving – No Class</b>	
		11/26/21	<b>Thanksgiving – No Class</b>	
35	Mon	11/29/21	Nutrient Cycling III	Nutrient Cycling S3-S4
36		12/1/21	Class Discussion: Wastewater Treatment	
37		12/3/21	Climate Change I	Climate Change S1-S2
38	Mon	12/6/21	Climate Change II	Climate Change S3-S4
39		12/8/21	Climate Change III	Climate Change S5
40		12/10/21	Climate Change IV	<b>TBD</b>

**Final Exam: Wednesday, December 15, 2021 from 8:00 AM – 10 AM.**

\* Readings are in SimUText unless otherwise noted.

## Course guidelines and policies:

### Grading

Your final grade for this course will be given according to the +/- grading system based on the percentage of points accumulated over the course of the semester, which will be distributed as follows:

Exam 1	500	points
Exam 2	500	points
Final Exam (Cumulative)	500	points
SimUText Readings (30 * 10)	300	points
Clicker Responses (33 * 9)	297	points
<hr/>		
Total	2097	Points

*NOTE: No rescheduling of exams except for documented medical emergencies. If you have a conflict, you must let me know in advance and we may be able to arrange for you to take it early.*

### Tests

There will be three multiple-choice exams. All 3 will be taken in our regular classroom, ISB 110. Dates and times can be found on the class schedule (above).

### SimUText Readings and Questions

SimUText is an interactive general ecology textbook that I have helped to author. It is built on the philosophy that students learn best by doing—by actively engaging with the material as they learn it. It is a popular textbook that is used in hundreds of classes across the country each year. And while I do believe it to be the best teaching text available for general ecology, I recognize the possible conflict of interest involved when I am a coauthor. As a result, I will donate my royalties for sales to UM students, which will likely be approximately \$300, to the Five Valley Land Trust, a local charity that works on conservation issues.

SimUText is a comparatively affordable text that costs \$89/student when purchased directly from SimBio. It costs somewhat more when purchased through the bookstore.

**There will be approximately 32 assignments in SimUText, which means you can expect read something in preparation for nearly every class. Assignments are listed by due date when you log in to the SimUText application.**

Approximately 14% of your final graded will be based on the questions imbedded in the SimUText Ecology chapters. There are three types of questions: (1) **Instant-feedback questions** are found throughout the text and designed to help you check your understanding of the material. (2) **Graded questions** are found at the end of each section and designed to assess your

understanding of the material. (3) **Ask-Your-Instructor:** Each section also includes an open-ended question that allows you to raise questions about topics you find confusing or unclear.

#### **SimUText Grades (10 points per assignment):**

- **6 points** for the proportion of the *instant-feedback questions* you attempt
- **4 points** for the proportion of the *graded questions* you answer correctly

Each lecture, we will spend some time reviewing concepts that the class struggled with. Additionally, we will address the best questions posed via *Ask-Your-Instructor*.

- **Prior to each exam, prizes will be awarded to the students who pose the best Ask-Your-Instructor question!**
- **All assignments are due at 6:00 AM the day of class.**  
Assignments are due early so that I can adjust the lecture to respond to questions raised by the class.
- **No late submissions will be accepted for any reason** other than a family or medical emergency. In this case, you must contact me ASAP to confirm excuse. Late submissions cannot be accepted after scores are published.
- **The three lowest assignment scores will be dropped.** Thus, out of the 32 reading assignments listed in SimUText, only 29 will count. This means you could earn up to 290 points for your readings.

#### **Lectures & iClicker Responses**

iClicker polls are an effective means of making classes more interactive and prompting discussions with your classmates. I will use iClicker REEF to assess your understanding of key concepts, to create a more engaging atmosphere, and to provide data for the class to analyze. In addition, we will have a number of in-class exercises that require active participation.

With the exceptions of the first day of class and days on which there is an exam, there are 38 lectures scheduled this year. Credit will be given for class participation in each of these classes to students who answer >75% of the iClicker questions and/or complete any additional in-class exercises. Each day 9 points will be awarded to all students who fully participate (all or nothing).

Because life occasionally intrudes, causing students to miss class, the 6 lowest class participation scores will be dropped. Thus, participation will be based on 34 of 40 lecture for 297 points.

#### **Grading Option Statement**

Please note, this class is offered for traditional letter grade only, it is not offered under the credit/no credit option.

## **COVID Protocols**

The University of Montana is requiring that you wear masks whenever you are in class. We will adhere to this requirement. Masks will be available if you forget, but students who refuse to wear a mask will be asked to leave.

We are also required to maintain a seating chart. Given the size of the class and the potential disruptions with students arriving late, I will simply take a picture of the class each day. This picture will be solely for contact tracing should the need arise. Since everyone will be wearing a mask and thus that much harder to identify, please write your name on a piece of paper and bring it to class to hold up when I take the picture.

**Speaking of getting sick, please do not come to class if you are exhibiting any symptoms of COVID-19.** I will work with you to try and figure out ways that you can avoid falling behind should illness keep you from class. I will be posting lecture slides on moodle and, hopefully, will be able to record lectures, too. I may even end up recording and or streaming lectures via ZOOM.

However, it is important to recognize that the situation is evolving and we may be forced on line at any point. If we are forced on line, we will continue to meet during our regularly scheduled time, most likely via Zoom.

## **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. The Code is available for review online at: <http://www.umt.edu/student-affairs/community-standards/default.php>

Please note that whenever you are representing another person's work as your own you are committing plagiarism. This includes asking a fellow student to submit clicker answers for you or submitting answers to SimUText that are not your own.

## **Disability modifications**

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](mailto:ode@umontana.edu), or visit [www.umt.edu/disability](http://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.

## Course withdrawal

Important Dates Restricting Opportunities to Drop a Course Fall 2021.

For more details see: <https://www.umn.edu/registrar/calendar/autumn-2021.php>

- Until day Sept 8 (Day 7) @ 5PM, students can add or drop using Cyberbear
- From Sept 8 @ 4PM until Sept 20 (Day 15) @ 5 PM, students can add and/or drop classes on Cyberbear with an **instructor override**
- From Sept 20 @ 5 PM until Nov 1 (Day 45) @ 5PM, students can drop using form with instructor and advisor signature and a \$10 fee from the registrar. **Students will receive a "W"**.
- From Nov 2 @ 5 PM until Dec 10 @ 5 PM, students are only allowed to drop under very limited and unusual circumstances.